



2017 Update to Multi Hazard Mitigation Plan



**Cascade County, MT
City of Great Falls and
Towns of Belt,
Cascade, and Neihart**



June 2017



TETRA TECH



**2017 UPDATE TO
MULTI-HAZARD MITIGATION PLAN

FOR

CASCADE COUNTY, MONTANA
AND
CITY OF GREAT FALLS, TOWN OF BELT,
TOWN OF CASCADE, AND TOWN OF NEIHART**

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LIST OF ACRONYMS

AFB	Air Force Base
BLM	Bureau of Land Management
BNSF	Burlington Northern-Santa Fe Railroad
BOR	U.S. Bureau of Reclamation
CDBG	Community Development Block Grant
CEIC	Census and Economic Information Center
CPRI	Calculated Priority Risk Index
CRP	Conservation Reserve Program
CRS	Community Rating System
CWPP	Community Wildfire Protection Plan
DEQ	Montana Department of Environmental Quality
DES	Disaster and Emergency Services
DFIRM	Digital Flood Insurance Rate Map
DMA	Department of Military Affairs
DMA	Disaster Mitigation Act
DNRC	Montana Department of Natural Resources and Conservation
DOI	U.S. Department of Interior
DPHHS	MT Department of Health and Human Services
EAP	Emergency Action Plan
EMP	Electro-Magnetic Pulse
EMPG	Emergency Management Performance Grant
EMS	Emergency Medical Services
EOC	Emergency Operations Center
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
FAA	Federal Aviation Administration
FD	Fire District
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
FP&S	Fire Prevention & Safety
FSA	Fire Service Area
FWS	U.S. Fish and Wildlife Service
GIS	Geographic Information Systems
HMGP	Hazard Mitigation Grants Program
IBC	International Building Code
IDSA	Infectious Disease Society of America
IRC	International Residential Building Code
LEPC	Local Emergency Planning Committee
LIDAR	Light Detection and Radar
LOMA	Letter of Map Amendment
LOMAR	Letter of Map Revision

LIST OF ACRONYMS

MDOR	Montana Department of Revenue
MDT	Montana Department of Transportation
MHMP	Multi-Hazard Mitigation Plan
NRDP	National Drought Resiliency Partnership
NCDC	National Climatic Data Center
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NID	National Inventory of Dams
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NRIS	Natural Resource Information System
NTSB	National Transportation Safety Board
NEW	NorthWestern Energy
NWS	National Weather Service
PAL	Provisional Accreditation Levee
PDM	Pre-Disaster Mitigation
PDMC	Pre-Disaster Mitigation Competitive (grants program)
RFA	Rural Fire Assistance
RFD	Rural Fire District
SHELDUS	Spatial Hazard Events and Losses Database for the United States
SPLC	Southern Poverty Law Center
STD	Sexually Transmitted Disease
TIF	Tax Increment Financing
TRI	Toxic Release Inventory
USACE	United States Army Corps of Engineers
USDA	United State Department of Agriculture
USFS	United States Forest Service
WHO	World Health Organization
WRN	Weather Ready Nation
WUI	Wildland Urban Interface

SECTION 1. INTRODUCTION

1.1 Background

In response to the requirements of the Disaster Mitigation Act of 2000 (DMA 2000), Cascade County, the City of Great Falls, the Town of Belt, the Town of Cascade, and the Town of Neihart, have developed this Multi-Jurisdictional Multi-Hazard Mitigation Plan (MHMP). DMA 2000 amends the Stafford Act and is designed to improve planning for, response to, and recovery from, disasters by requiring State and local entities to implement pre-disaster mitigation planning and develop MHMPs. The Federal Emergency Management Agency (FEMA) has issued guidelines for development of Hazard Mitigation Plans. The Montana Disaster and Emergency Services (DES) supports plan development for jurisdictions in the State of Montana.

Hazard Mitigation is any sustained action taken to reduce or eliminate the long term risk and effects that can result from specific hazards.

FEMA defines a **Hazard Mitigation Plan** as the documentation of a state or local government evaluation of natural hazards and the strategies to mitigate

Cascade County completed and adopted a Pre-Disaster Mitigation (PDM) Plan in 2011 to help guide and focus hazard mitigation activities. The County, working together with Tetra Tech Inc., has prepared this update to their PDM Plan to satisfy the requirement that MHMPs be updated every five years. The updated Cascade County MHMP profiles significant hazards to the community and identifies mitigation projects that can reduce those impacts. The purpose of the updated MHMP is to promote sound public policy designed to protect residents, critical facilities, infrastructure, private property, and the environment from natural and man-made hazards. The updated Cascade County MHMP includes resources and information to assist residents, organizations, local government, and others interested in participating in planning for natural and man-made hazards. This 2017 updated MHMP supersedes the 2011 PDM Plan.

1.2 Authority

The Cascade County MHMP update has been developed pursuant to the requirements in the Interim Final Rule for hazard mitigation planning and the guidance in the State and Local Plan Interim Criteria under DMA 2000. The Plan also meets guidance developed by FEMA in June of 2008 for Multi-Jurisdictional Mitigation Planning.

The Cascade County Board of County Commissioners have adopted this MHMP. Also adopting the Plan are the incorporated communities of Great Falls, Belt, Cascade, and Neihart. These governing bodies have the authority to promote sound public policy regarding natural and man-made hazards in their jurisdictions. Copies of the signed resolutions are included as **Appendix A** to this plan. The MHMP was adopted at the regularly scheduled County Commission and City/Town Council meetings, which were open to the public and advertised through the typical process the jurisdictions use for publicizing meetings.

Cascade County will be responsible for submitting the adopted MHMP to FEMA for review. Upon acceptance by FEMA, Cascade County and the incorporated communities of Great Falls, Belt, Cascade

and Neihart will remain eligible for mitigation project grants and post-disaster hazard mitigation grant projects.

1.3 Acknowledgements

Many groups and individuals have contributed to development of the Cascade County MHMP. Cascade County DES provided support for all aspects of plan development including providing digital locations and insurance values for the critical facilities and infrastructure used in the PDM analysis. The MHMP Planning Team, comprised of various members of the Local Emergency Planning Committee (LEPC) and other community members, met on a regular basis to guide the project, identify the hazards most threatening to the County, develop and prioritize mitigation projects, review draft deliverables and attend the public meetings. The local communities participated in the planning process by attending public meetings and contributed to plan development by reviewing and commenting on the draft plan.

1.4 Scope and Plan Organization

The process followed to prepare the Cascade County MHMP update included the following:

- Review and prioritize disaster events that are most probable and destructive,
- Update and identify new critical facilities,
- Review and update areas within the community that are most vulnerable,
- Update and identify new goals for reducing the effects of a disaster event,
- Review and identify new projects to be implemented for each goal,
- Review and identify new procedures for monitoring progress and updating the MHMP,
- Review the draft MHMP, and
- Adopt the updated MHMP.

The MHMP is organized into sections that describe the planning process (Section 2), community profile (Section 3), risk assessment (Section 4), mitigation strategies (Section 5) and plan maintenance (Section 6). Appendices containing supporting information are included at the end of the plan.

SECTION 2. PLANNING PROCESS

The updated Cascade County MHMP is the result of a collaborative effort between Cascade County, the incorporated communities of Great Falls, Belt, Cascade, and Neihart, utilities, local agencies, non-profit organizations, businesses, and regional, state and federal agencies. The planning effort was facilitated by the contractor, Tetra Tech. Public participation played a key role in development of goals and mitigation projects, as outlined below. For the purposes of this planning effort, the public is defined as residents of Cascade County, local departments, state and federal agencies that support activities in the County, neighboring communities and local partners.

2.1 MHMP Planning Team

The Cascade County DES Coordinator requested that various members of the LEPC and other community members serve as the MHMP Planning Team for the purposes of updating the MHMP. These individuals are listed in **Appendix B**. The affiliation of these participants are presented in **Table 2.1-1**.

Table 2.-1. Agencies Represented on the MHMP Planning Team

Organization / Department / Position	Type of Organization
Cascade County / Disaster & Emergency Services Coordinator	County Government
Cascade County Public Works Department / Deputy Director	County Government
Cascade County Sheriff's Office / Captain of Operations & Lieutenant	County Government
City of Great Falls / Emergency Manager	City Government
City of Great Falls / Development & Planning / Floodplain Administrator	City Government
City of Great Falls / Police Department / Lieutenant	City Government
City of Great Falls / Fire Department / Chief	City Government
City of Great Falls Public Works / Director & Environmental Division	City Government
City of Great Falls Information Technology	City Government
Cascade City-County / Health Department / Preparedness & Communications	City-County Government
Cascade County Rural Fire Council / Vice Chairman	Local Fire Response
West Great Falls Flood Control & Drainage District	Local Flood Organization
Town of Belt / Mayor	Town Government
Town of Belt / Clerk	Town Government
Town of Cascade / Mayor	Town Government
Town of Cascade / Floodplain Administrator & Clerk	Town Government
Town of Neihart / Mayor	Town Government
Montana Air National Guard / Emergency Manager	State Government
Montana Disaster & Emergency Services / District #2 Representative	State Government
Malmstrom Air Force Base / Emergency Manager	Federal Government

Responsibilities of the Planning Team included attending conference calls to discuss update of the Plan, providing data for analysis in the risk assessment, attending public meetings, providing input and feedback on mitigation strategies, review of the draft plan document, and supporting the plan throughout the adoption process. The MHMP Planning Team will assist the Cascade County DES in updating the Plan in the future.

The Planning Team met several times over the course of the project; once to rank the hazards, and three other times to update the mitigation strategy. Conference calls were held on November 22nd,

2016, January 10th, February 1st and February 28th, 2017. In advance of each conference call, an agenda and/or materials to be discussed (i.e. hazard maps, hazard ranking matrices, example mitigation strategies, etc.) were emailed to meeting participants. Planning Team conference call notes are presented in **Appendix B**.

A meeting was held on January 23, 2017 with the Cascade County Rural Fire Council to review the wildfire hazard area used in the MHMP analysis and update the wildfire mitigation strategy. The meeting included representatives from the Black Eagle Volunteer Fire Department (VFD), Cascade VFD, Fort Shaw VFD, Manchester VFD, Sand Coulee VFD, Vaughn VFD, Simms VFD, Malmstrom Air Force Base Fire, a County Commissioner, Cascade County DES, and the Salvation Army.

Meetings were held on January 31, 2017 with the mayors and town clerks/floodplain administrators from the towns of Belt and Cascade to review critical facilities and mitigation strategies for the 2017 Cascade County MHMP. These Planning Team members were generally unable to attend the regularly scheduled meetings and conference calls due to conflicting schedules; therefore, separate meetings were held to obtain input for the MHMP.

2.2 Project Stakeholders

The planning process was initiated by preparing a stakeholders list of individuals whose input was needed to help prepare the MHMP. Planning partners on the stakeholders list received a variety of information during the project including meeting notices, documents for review, and the draft mitigation strategy. **Appendix B** presents the stakeholders list for this project.

On the County level, project stakeholders included the Commissioners, County Attorney, DES, Health Department, Risk/Safety Management, Public Works (including Road & Bridge, Planning Division, Floodplain Administrator and GIS), Sheriff's Office, Extension Service, and Department of Technology. These entities participated in the planning process by either providing data, attending public meetings, participating on the MHMP Planning Team, and/or reviewing the draft MHMP.

Stakeholders from the City of Great Falls included: the Mayor, City Manager, Commissioners, Emergency Management & Preparedness, Police and Fire Departments, Planning & Community Development including Building Department and Floodplain Administrator, Public Works, GIS, Information Technology, and Public Schools. These entities participated in the planning process by either providing data, attending public meetings, participating on the MHMP Planning Team, and/or reviewing the draft MHMP.

Stakeholders from the Towns of Belt, Cascade, and Neihart included: the Mayors, Clerks, Public Works Departments, Floodplain Administrators and/or Schools. These entities participated in the planning process by either providing data, attending public meetings, participating on the MHMP Planning Team, and/or reviewing the draft MHMP.

Stakeholders from local districts and departments (flood control, fire) included the West Great Falls Food Control and Drainage District; Great Falls Emergency Medical Services (EMS) and Fire Rescue, Cascade County Rural Fire Council and, Dearborn and Vaughn Volunteer Fire Departments. These entities participated in the planning process by either providing data, attending public meetings, participating on the MHMP Planning Team, and/or reviewing the draft MHMP.

Stakeholders from federal agencies included representatives from: the National Weather Service (NWS), U.S. Forest Service, Bureau of Land Management, and Malmstrom Air Force Base. These agencies were provided information on plan development, attended public meetings, and/or reviewed the draft MHMP.

Stakeholders from state agencies included representatives from: the Montana Highway Patrol, Montana Air National Guard, Montana Department of Natural Resources and Conservation (DNRC), Montana Department of Transportation, Montana State University–Great Falls College and, the District Representative and Deputy Hazard Mitigation Officer from Montana DES. These entities participated in the planning process by providing data for the plan, participating on the MHMP Planning Team, attending the public meetings and/or reviewing the draft MHMP.

Non-governmental stakeholders (non-profits, medical, utilities, businesses) included: Great Falls Amateur Radio Club, Salvation Army, and American Red Cross; Benefis Health Systems and Great Falls Clinic; NorthWestern Energy; Malteurop NA Inc., Greenfield Industries, Phillips 66/Yellowstone Pipeline Co., DVM, and Burlington Northern-Santa Fe Railway Company. Some of these entities provided information for plan development, attended the public meetings, and/or reviewed the draft MHMP update.

Planning partners from adjoining jurisdictions included: the Teton, Chouteau, Judith Basin, Meagher, and Lewis & Clark County DES Coordinators. These entities did not offer input on the Cascade County MHMP update.

2.3 Review of Existing Plans and Studies

At the initiation of the project, planning documents and studies completed for Cascade County and the City of Great Falls were obtained from relevant websites and/or provided by the DES office. The plans and studies were reviewed in order to determine how mitigation could be integrated into this planning process and future local planning mechanisms and programs. Contributing plans/ordinances reviewed by the contractor included:

DAMS

- Emergency Action Plan, Black Eagle Dam
- Emergency Action Plan, Cochrane Dam
- Emergency Action Plan, Morony Dam
- Emergency Action Plan, Rainbow Dam
- Emergency Action Plan, Ryan Dam
- Emergency Action Plan, Canyon Ferry Dam (Lewis & Clark County)
- Emergency Action Plan, Gibson Dam (Lewis & Clark County)
- Emergency Action Plan, Hauser Dam (Lewis & Clark County)
- Emergency Action Plan, Holter Dam (Lewis & Clark County)
- Emergency Action Plan, Willow Creek Dam (Lewis & Clark County)
- Emergency Action Plan, Pishkun Dikes (Teton County)

EMERGENCY OPERATIONS

- Cascade County Emergency Operations Plan, 2011

FLOOD STUDIES

- Cascade County Flood Insurance Study, 2013

GROWTH POLICIES, ORDINANCES, REGULATIONS

- Cascade County Growth Policy, 2014
- Cascade County Subdivision Regulations, 2013
- Cascade County Zoning Regulations, 2016
- Cascade County Floodplain Regulations, 2013
- City of Great Falls Growth Policy, 2013
- City of Great Falls Subdivision Regulations
- City of Great Falls Zoning Regulations, 2017
- City of Great Falls Amendment to Floodplain Regulations, 2016
- Town of Cascade Growth Policy, 2011
- Town of Neihart Growth Policy, 2016
- Missouri River Urban Corridor Plan, 2004
- Malmstrom Air Force Base Joint Land Use Study, 2012

HAZARD MITIGATION

- Cascade County Pre-Disaster Mitigation Plan, 2011
- Cascade County Community Wildfire Protection Plan, 2008

OTHER

- Long Range Transportation Plan, 2014
- City of Great Falls Snow & Ice Control Plan, 2007

The data obtained from the plan and regulation review was incorporated into various sections of the MHMP. A summary of land use implementation tools is presented in *Section 3.7.1*. *Section 4.0* contains reference to the plans and ordinances affecting management of the hazard. *Section 7.3* includes a discussion on how mitigation can be implemented through existing programs.

2.4 Project Website

A website was set up at the start of the project to provide information to project stakeholders and the citizens of Cascade County. The project website can be viewed at: www.countypdm.com/ (password: Great Falls). The website remained active during the course of the project through adoption of the plan.

The website contained a Home page and pages for: Contacts, MHMP Planning Team, Meetings, Draft MHMP, Maps, and References. The Home page contained a letter inviting participation in development of the Plan. The Contacts page contained information on Tetra Tech and County personnel involved in management of the project. The Planning Team page contained the meeting schedule, agendas, handouts, and notes from the Planning Team meetings. The Meetings page contained the public meeting schedule, notes, handouts and presentations from the public meetings. The Draft MHMP page contained sections from the draft plan for stakeholder review. The Maps page contained draft versions of the critical facility and hazard maps prepared for the project. The References page contained the 2011 Cascade County PDM Plan, FEMA guidance on preparing multi-

jurisdictional hazard mitigation plans, the FEMA Region 8 Plan Review Guidance dated September 2011, FEMA Planning Process Bulletin dated July 2016, FEMA Risk Assessment Bulletin dated June 2016, and links to the State of Montana PDM Plan and FEMA websites.

2.5 Project Meetings

Two public meetings were conducted during development of the MHMP. The first public meeting was held to kick-off the project. At this meeting, the 2011 PDM plan was reviewed and hazard events over the past five years were discussed. The second public meeting was held to review the draft risk assessment and mitigation strategy and to kick-off the public review period for the draft MHMP. Sign-in sheets, handouts, presentations, and meeting notes are contained in **Appendix B** and posted on the project website.

The first public meeting was held on October 6, 2016 at the Cascade County DES office in Great Falls. The October 1, 2016 edition of the Great Falls and the October 6, 2016 edition of the Cascade Courier newspapers published articles on the PDM Update project and advertised the public meeting. A meeting notice was sent via e-mail to all project stakeholders and the meeting was posted on the project website. Media documentation is presented in **Appendix B**.

During the first public meeting, Tetra Tech made a presentation which reviewed and analyzed each section of the 2011 mitigation plan, outlined the background and rationale for updating the MHMP, the process and methodology for the plan update, and the project schedule. **Table 2.5-1** describes the outcome of the 2011 PDM Plan review.

Table 2.5-1. Review and Analysis of 2011 Pre-Disaster Mitigation Plan

2011 PDM Sections	How Reviewed and Analyzed
Section 1 – Introduction	Reviewed existing section through discussion at public meeting. No analysis needed.
Section 2 - Planning Process	Reviewed and analyzed existing section through discussion at public meeting. Planning process utilized stakeholders list, MHMP Planning Team, public meetings, and project website.
Section 3 – Hazard Evaluation and Assessment	Reviewed and analyzed existing section through discussion during public meeting and Planning Team meetings. Reviewed and updated critical facility maps and bridges. Re-scoring hazards using Calculated Priority Risk Index. Reviewed and updated hazards updating sections with recent hazard data.
Section 4 - Mitigation Strategy	Reviewed at public meeting and updated by Planning Team during several meetings. New projects developed, existing projects re-worded and/or deleted, completed projects documented. Capability assessment updated.
Section 5 - Plan Maintenance Procedures	Reviewed and analyzed existing section through discussion during Planning Team meetings. Determined that plan maintenance procedures outlined in previous plan were implemented but not documented.

The meeting presentation was placed on the project website for stakeholders who could not attend the meeting (**Appendix B**). Approximately 34 individuals attended the public meeting including representatives from: Cascade County DES, Public Health Department, and Sheriff's Office; City of Great Falls Emergency Management, Planning & Community Development, Police Department, Public Schools, Fire Rescue, and Airport; the West Great Falls Flood Control & Drainage District, Montana

Air National Guard, Montana DES, Malmstrom Air Force Base, National Weather Service, NorthWestern Energy, Benefis Health System, Great Falls Amateur Radio, Cascade Courier newspaper, Malteurop NA Inc., Phillips 66 Pipeline Company, Burlington Northern-Santa Fe Railway Company, and two members of the public.

A second public meeting to review the draft MHMP was held on May 11, 2017 at the Cascade County DES office in Great Falls. The public meeting was held at the beginning of the draft Plan public review period. A notice of the meeting was sent via email to the project stakeholders, advertised in an article in the April 28, 2017 edition of the Great Falls Tribune and on the project website. Tetra Tech presented results of the PDM risk assessment at the meeting as well as the updated mitigation strategy. Seventeen (17) individuals attended the public meeting including representatives from the Cascade County DES, City-County Health Department, City of Great Falls Emergency Management, Police Department and Planning & Community Development, Montana Air National Guard, Malmstrom Air Force Base, West Great Falls Flood Control and Drainage District, Sweetgrass Development Corp., NorthWestern Energy, Benefis Health System, and Phillips 66 Pipeline Company. Public meeting attendees networked before and after the meeting, listened to the presentation, and asked questions.

2.6 Plan Review

The planning process for the MHMP began on September 14, 2016 and lasted approximately nine months. The public was provided at least two opportunities for comment prior to adoption of the plan. The first opportunity was during the drafting process. A notice was placed in the newspaper, on the county website, and via social media regarding availability of the draft MHMP and that review copies were available in hard copy, electronically on compact disk (CD) upon request, or available on the project website. A hard copy of the draft Plan was available for review at the Cascade County DES Office. An e-mail announcement was sent to the project stakeholders indicating the draft MHMP was available for review with instructions on how to comment.

The draft document was produced with line numbers to aid in the review process. Reviewers were asked to submit their comments on the draft plan to the Cascade County DES Office after a review period of approximately 30-days (May 15, 2017 to June 15, 2017). The Cascade County DES Coordinator reviewed the comments and in consultation with the Planning Team submitted a consolidated list of comments to the contractor and a plan revision was completed.

The final draft plan was posted on the project website and stakeholders were notified of its availability via an e-mail message and social media. At this point a second opportunity was provided to the public to comment on the MHMP. The final draft plan was available for a second review from June 21 to September 21, 2017, an approximate 90-day review period.

Concurrent with the second public review period, the draft MHMP was submitted to the State Hazard Mitigation Officer and FEMA for compliance with the Region 8 Plan Review Guidance. The final draft Plan was placed on the project website and stakeholders were notified via email regarding its availability. Comments received from Montana DES and FEMA, along with comments received from the second public review of the final draft, were addressed in a second plan revision.

Section 2: Planning Process

The final Plan was provided to the Cascade County Board of County Commissioners, the Great Falls City Council, and Town Councils for Belt, Cascade, and Neihart for adoption. After adoption, copies of the final Plan were submitted to Cascade County, the incorporated communities, Montana DES and FEMA.

Future comments on the MHMP should be addressed to:

Cascade County Disaster and Emergency Services
521-1st Avenue NW
Great Falls, Montana 59404
(406) 454-6900

SECTION 3. COMMUNITY PROFILE

This section of the MHMP presents an overview of Cascade County and the communities of Great Falls, Belt, Cascade, and Neihart, the jurisdictions which comprise this plan. Information is provided on the characteristics of the county, the economy and land use patterns, and presents the backdrop for this mitigation planning process.

3.1 Physical Setting

Cascade County is located in north-central Montana, east of the continental divide, in the transitional area between the Great Plains and Rocky Mountains and covers 2,698 square miles (**Figure 1**). The County seat is the City of Great Falls, serving as a regional hub for medical, retail, and transportation for the region, accounts for about 72 percent of the County's population. Incorporated communities in Cascade County include the City of Great Falls and Towns of Belt, Cascade and Neihart. Unincorporated communities include Black Eagle, Centerville, Fort Shaw, Monarch, Sand Coulee, Simms, Stockett, Sun Prairie, Sun River, Tracy, Ulm, and Vaughn. Malmstrom Air Force Base is located in the County, but is adjacent to the City of Great Falls' eastern municipal boundary.

The majority of Cascade County is relatively flat and elevations range from 8,621 feet in the Highwood Mountains to 2,700 where the Missouri River exits the County. The County is bordered on the west by the Rocky Mountains, to the southeast by the Little Belt and the Highwood Mountains, and by the Hi-line area to the north. Most lands in the county are used for agriculture.

The City of Great Falls is located in the Missouri River Basin, at the confluence of the Missouri and Sun Rivers. The Missouri River Basin is the largest basin in the State of Montana, draining more than half of the State's land. The Missouri River approaches from the south and the Sun River joins the Missouri River from the West. Other watersheds in the county include the Smith River, the Dearborn River, and Belt Creek.

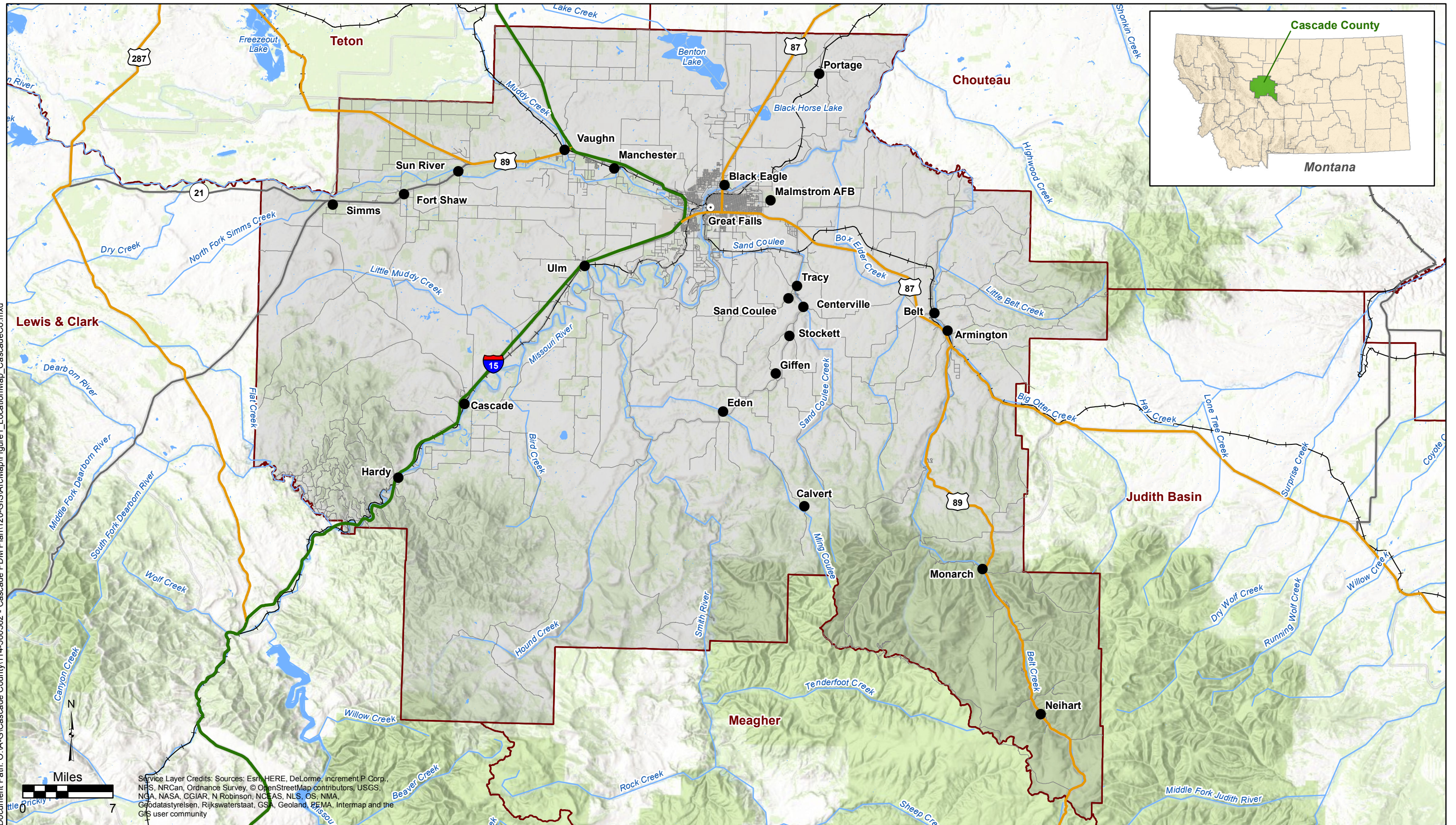
Landownership in Cascade County is 81.7 percent private, 12.4 percent federal, and 5.2 percent state. Federally owned land is administered by the U.S. Forest Service (178,412 acres), Bureau of Land Management (24,627 acres), U.S. Fish and Wildlife Service (7,148 acres) and Bureau of Reclamation (1,361 acres).

Population density in Cascade County is 30.1 persons per square mile. Great Falls, the third largest city in Montana has a population density of 2,909 persons per square mile. **Figure 2** presents landownership and population density in Cascade County.

3.2 Climate

Cascade County has a moderate, seasonal climate. The average daily high temperature is between 75 and 85 degrees in the summer and between 20 and 40 degrees in the winter. The average daily low temperature in Cascade County is between 40 and 55 in the summer season and between 10 and 25 in the winter. Cascade County averages between 10 to 16 inches of rain per year with the vast majority of the precipitation occurring from April to September. The highest rainfall occurs in the

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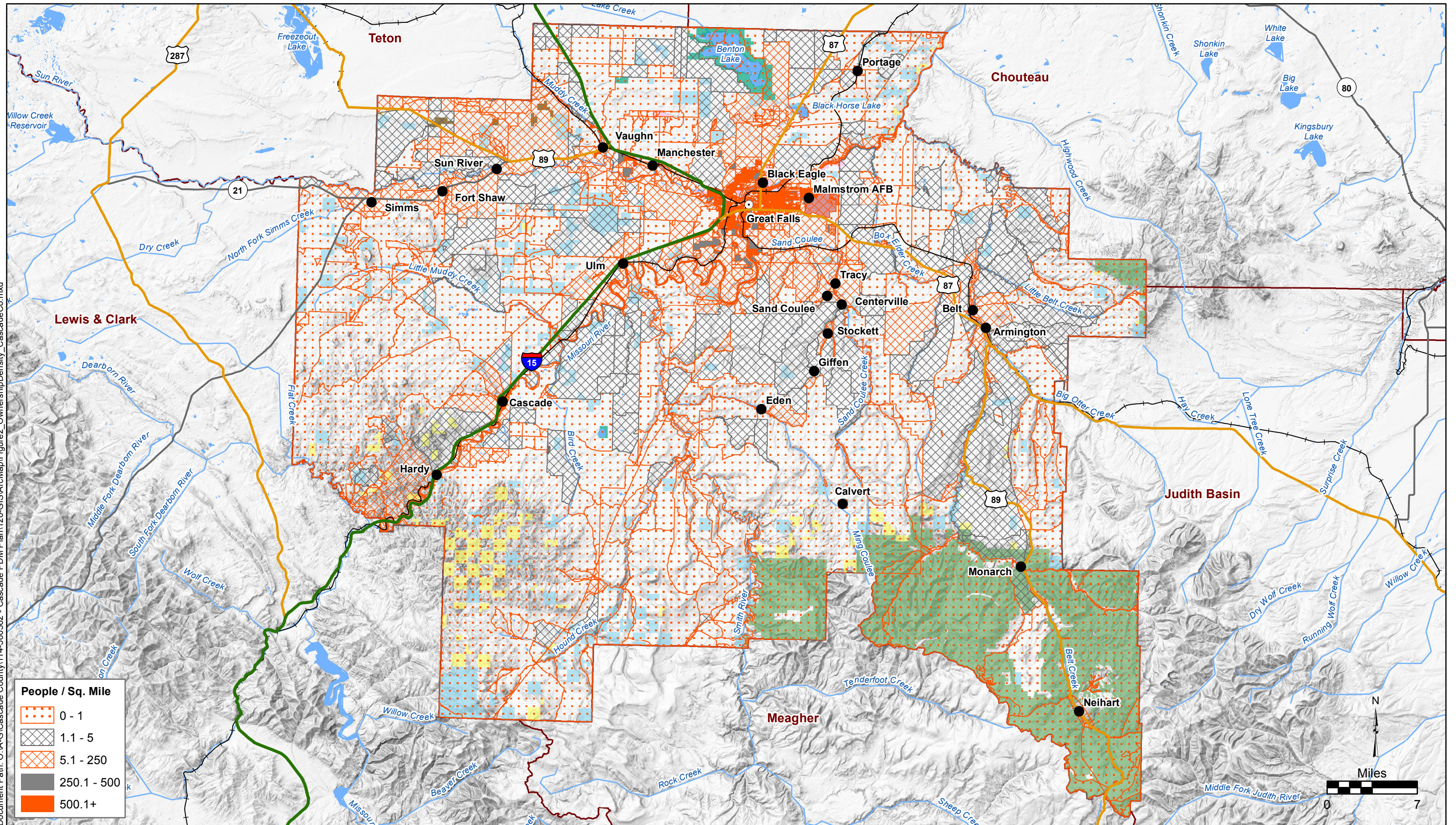


Legend

- | | | | |
|---------------|-------------------|------------------|-------------------|
| ● Place | — Interstate | — Other Route | — River/Stream |
| ○ County Seat | — U.S. Highway | — Railroad | — County Boundary |
| | — Montana Highway | — Lake/Reservoir | |

Figure 1
Location Map
Cascade County, Montana
Multi-Hazard Mitigation Plan

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Date: 3/17/2017

Figure 2



Legend

- Place
- County Seat
- Interstate
- U.S. Highway
- Montana Highway
- Railroad
- River/Stream
- Lake/Reservoir
- County Boundary
- City Government
- County Government
- State
- Bureau of Land Management
- US Bureau of Reclamation
- US Dept. of Defense
- US Fish & Wildlife Service
- US Forest Service

Land Ownership & Population Density
Cascade County, Montana
Multi-Hazard Mitigation Plan

Highwood Mountains and averages 29 inches a year. Cascade County is considered to have a semi-arid climate.

Winters in Cascade County are typically not as cold as might be expected given the area's northern latitude. This is largely due to its location on the leeward side of the Rocky Mountains and the warm Chinook winds that frequently occur. Periods of below-zero temperatures are common each winter but they seldom last for more than a few days. January tends to be the coldest month with an average low temperature of 12.5 degrees F. Snowfall averages about 63 inches per year in the region with the Showdown Ski Resort receiving approximately 200 inches of snow a year.

An important element of the climate in Cascade County is the wind. Cascade County lies within the Chinook zone, which is associated with 160 mph wind speeds. Chinook winds during the winter and early spring can lead to significant snow melt and flooding of small streams and rivers. Average wind speeds range from 10 to 15 mph depending on the exposure of the location. The average and peak sustained winds tend to be stronger over higher, more exposed terrain and areas below steep canyons. High wind gusts often occur with thunderstorms during the summer, with gusts over 60 mph occurring every year. The highest sustained winds tend to occur in the spring and fall, when long-lasting Chinook events are most likely to occur. **Table 3.2-1** presents climate statistics for the City of Great Falls.

Table 3.2-1. Cascade County Climate Statistics – Great Falls

Category	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average High (°F)	35	38	46	56	65	73	83	82	70	58	43	35
Average low (°F)	15	16	23	31	39	46	51	50	42	33	23	15
Avg. Precipitation (Inches)	0.51	0.47	0.91	1.42	2.4	2.52	1.5	1.57	1.42	0.87	0.59	0.55
Average Snowfall (Inches)	9	8	12	9	3	0	0	0	1	4	8	9

Source: <http://www.usclimatedata.com/climate/great-falls/montana/united-states/usmt0146>

For the purposes of this mitigation plan, weather is of interest when it threatens property or life and thus becomes a hazard. The National Weather Service provides short-term forecasts of hazardous weather to the public and also records weather and climatic data. Further information on NWS weather warning criteria is presented in the individual hazard profiles in *Section 4.0*.

Climate Change

Climate change will affect the people, property, economy and ecosystems of Cascade County in a variety of ways. The most important effect for the development of this plan is that climate change will have a measurable impact on the occurrence and severity of natural hazards.

A climate change study by the University of Montana predicts warmer temperatures and associated drought over the course of the next century with annual temperatures projected to warm 3.6 to 7.2 degrees. Winters will be shorter and summers will be longer with spring snowmelt occurring four to six weeks earlier and summer drought periods lasting six to eight weeks longer.

Climate change indicators provide useful information about what is occurring in complex systems. These indicators include temperature and growing season, rainfall intensity, snowpack, streamflow, stream temperature, wildland fire occurrence, plants live cycle events, and forest health. The hazard profiles in *Section 4* provide climate change implications as they relate to hazard mitigation.

3.3 Critical Facilities and Infrastructure

Critical facilities are of particular concern because they provide essential products and services that are necessary to preserve the welfare and quality of life and fulfill important public safety, emergency response, and/or disaster recovery functions. Critical facilities include: the 911 emergency call center, emergency operations centers, police and fire stations, public works facilities, sewer and water facilities, communication sites, hospitals and shelters. Critical facilities also include those facilities that are vital to the continued delivery of community services or have large vulnerable populations. These facilities may include: buildings such as the jail, law enforcement center, public services buildings, senior centers, community corrections center, the courthouse, and juvenile services building and other public facilities such as hospitals and schools.

Critical facilities in Cascade County are identified in **Appendix C**. Replacement values were collected where readily available; however, time and resource constraints prohibited the collection of values for all structures. A geographic information system (GIS) layer of the critical facilities was used in the hazard risk assessment. This GIS layer should be updated on a regular basis for use in future analysis. Further details on the county's critical facilities and infrastructure from the Cascade County Growth Policy (2014), the City of Great Falls Growth Policy (2013) and the 2011 Cascade County PDM Plan (Tetra Tech, 2011) are presented below.

3.3.1 Water and Wastewater Services

Municipal water systems serve the City of Great Falls, Belt, Neihart, Cascade and Ulm. The Missouri River is Great Falls' source of potable water. The municipal water system consists of the water plant, about 310 miles of distribution mains, seven pump stations, and seven storage tanks. The City of Great Falls provides water in some areas even though the properties are not within the city limits. The largest of these areas are Malmstrom Air Force Base and the Black Eagle Water District. Most of the residents and businesses in unincorporated Cascade County rely on groundwater for their needs because they are not connected to any central system.

Raw water from the Missouri River receives modern treatment methods of coagulation, flocculation, sedimentation, filtration and disinfection before it is pumped into water distribution lines. The Water Plant uses a conventional filtration system which treats and delivers an average of 4.5 billion gallons of drinking water per year. The system serves approximately 64,000 customers. Planned Water Plant improvements include UV disinfection to meet new regulatory standards, re-locating ammonia feed facilities for safety reasons and replacement of the electrical system for age and reliability reasons.

The City of Great Falls operates a sanitary sewer system that serves most of the residents, as well as some in outlying areas. The system consists of 256 miles of collector and transmission mains, 4,454 sewer manholes, 32 lift stations, and the wastewater treatment plant located on the Missouri River. Together this system operates to collect and treat 3.6 billion gallons of wastewater per year. Key system expenditures planned include \$4.4 million over the next few years to provide ultraviolet

disinfection and \$12.6 million to extract ammonia so as to meet new State and Federal standards. Other than the City of Great Falls, there are only six community sewer systems with lagoons in Cascade County. These are in the communities of Simms, Belt, Cascade, Sun Prairie, Vaughn and Stockett. All other communities use septic systems to collect, treat and dispose of wastewater.

The City of Great Falls maintains approximately 103 miles of public storm drains, over 3,700 manholes or inlets and seven detention basins. The natural and man-made drainage facilities in the area have been designed to accommodate most storm conditions. Developers must work with the Department of Public Works to demonstrate that there will be adequate stormwater conveyance and that adjacent property owners will not be adversely impacted.

3.3.2 Utilities

A series of five hydroelectric dams have been constructed on the falls of the Missouri River within Cascade County providing electricity to the power grid. NorthWestern Energy and the Sun River Electric Cooperative provide electrical power to the county. In the Great Falls area, Energy West provides natural gas services. Propane tanks are located throughout Cascade County at ranch and home sites.

3.3.3 Transportation

The primary roadways that serve Cascade County are composed of Interstate 15, US Highway 87/89 and Montana 200. Great Falls has a well-established roadway network composed of local streets, collector streets, minor arterials, and principal arterials and maintains approximately 383 miles of streets and alleys inside the city limits, including 80 miles that are not paved. Great Falls is the primary transportation hub within north central Montana, where majority of its highways pass through the City, connecting it to other communities and other major cities throughout Montana. Approximately 30 interstate carriers serve Great Falls providing a wide spectrum of service to and from everywhere in the U.S. and Canada.

Great Falls International Airport, the transportation hub for north central Montana, located in Great Falls, is a commercial service airport serving Great Falls and the surrounding community. Presently the complex includes the airfield, terminal, general aviation, commercial and noncommercial activities, airport and airline maintenance and support facilities and a fire station. Also included on the airport is the Montana Air National Guard which transitioned from fighters to larger C-130 cargo aircraft in 2012. Great Falls is served by Delta, United, Alaska, and Allegiant Airlines. FedEx occupies a 78,000 square foot facility at the airport serving the entire state. There are two fixed base operators who provide fuel and aircraft maintenance and repair.

Rail service is used to transport freight in Cascade County. Agricultural products are the main transport of freight railcars; however, bulk incoming manufactured products and lumber are moved by rail as well. Burlington Northern Santa Fe (BNSF) Railway is the primary operator of railroads within Cascade County and has a major rail yard in the City of Great Falls. There is presently no passenger rail service to Cascade County.

One bus carrier provides national and regional parcel and passenger service in Cascade County. In addition, the Great Falls Transit District operates seven bus routes and provides invaluable

connections to people with disabilities and special needs or restrictions. It also facilitates employment by stopping at key activity centers and job support facilities. In addition, the Transit system helps reduce congestion, emissions, and the number of cars on the roads in a safe and professional manner.

3.3.4 Law Enforcement and Emergency Services

Emergency services within Cascade County include fire protection, emergency medical services including ambulance transportation, law enforcement, and emergency preparedness. The Cascade County Sheriff's Department provides law enforcement and evacuation services and protects the County outside of Great Falls. Cascade County employs thirty-three deputy sheriffs. These deputies carry out all normal law enforcement duties as well as coordinate search and rescue operations. Each deputy is assigned an area in Cascade County. The incorporated towns of Cascade and Belt have chosen to contract with the Sheriff's Office to conduct law enforcement operations within their communities. Other than the Cities of Belt, Cascade, and Great Falls, the remaining communities in the County are provided two deputies on regional assignments to non-emergent response for questions, meetings and other contacts. Great Falls Emergency Services and Belt Ambulance provide ambulance service to the entire county.

The City of Great Falls Police Department consists of five bureaus; Patrol, Detective, Support, Records and Communications Bureaus. The Patrol Services Bureau consists of day to day patrol operations referred to as the backbone of the police department. Patrol officers are the front line for community services and traffic enforcement. The Investigative Services Bureau encompasses the Detective Division, Property and Evidence and the department's crime lab. This Bureau provides specialized services, general case investigations, sex crime and registration, drugs, street crimes, school resource detectives and the Safe Street Task Force. The Support Services Bureau includes community oriented policing, education, crime prevention, training and process servicing. In addition, the police manage animal control and dispatch, and central communication to all departments. The Communications Bureau handles 911 calls and dispatch personnel.

Fire Services

Rural Cascade County has a volunteer fire protection system that is trained and equipped for fire protection. The County has been broken into 16 fire districts, with the fire stations located in the larger communities. Fire related services are often extended across fire district boundaries of the County. Fire protection organizations providing fire services to Cascade County include Great Falls Fire/Rescue, Belt City Fire District (FD), and Neihart FD; Belt Rural Fire District (RFD); Fort Shaw Fire Service Area (FSA), Vaughn FSA, Black Eagle FSA, Cascade FSA, Gore Hill FSA, Monarch FSA, Sand Coulee FSA, Stockett FSA, Sun River FSA, Ulm FSA, Simms FSA, Dearborn FSA, Cascade Farmer/Rancher FSA; Montana DNRC; Lewis and Clark National Forest; and Bureau of Land Management. The Montana Air National Guard has a fire department located at the Great Falls International Airport and the Malmstrom Air Force Base has a fire department located at the Air Force Base in Great Falls.

The City of Great Falls provides fire and EMS services to 16 County Contracted Fire Districts. The City receives payment through a series of agreements for these contracted services. The City of Great Falls has 65 uniformed firefighters with 60 assigned to four shifts (15 per shift). The City has four frontline

apparatus in four fire stations. Three engine companies and one ladder company are staffed 24 hours a day seven days a week. The other apparatus options are reserves and not staffed. They are brought into service when one of the frontline apparatus needs repair or when firefighters are called for large incidents.

Disaster and Emergency Services

County emergency preparedness comes under the office of the Cascade County DES. Cascade County DES prepares and manages plans and programs directed at disaster preparedness and coordination of response and recovery. They maintain and deliver information to the public in coordination with fire protection agencies, law enforcement, and other emergency response providers.

DES provides the following services: plans, organizes, and manages the Cascade County Emergency Preparedness Program; evaluates, improves, and promotes comprehensive disaster planning efforts; organizes and facilitates effective operations of multi-jurisdiction, multi-discipline work groups and task forces; promotes interagency coordination; and, develops and reviews policies, contracts, and interagency agreements. These efforts are designed to enhance the capacity of the local government to plan for, respond to, and mitigate the consequences of threats and disasters using an all-hazards framework. Overall, DES emphasizes preparedness in addressing potential natural threats (wildfires, flooding). The City of Great Falls also has an Emergency Manager who coordinates with DES on disaster preparedness.

3.4 Population Trends

According to the 2015 U.S. Census estimates, Cascade County is the fifth most populous in Montana with a population of 82,278. This represents a 1.2 percent increase since the 2010 census. **Table 3.4-1** illustrates the change in population in Cascade County compared to the United States and State of Montana.

Table 3.4-1. County, State and National Population Trends

Year	Cascade Co. Population	% change from previous census	State of Montana Population	% change from previous census	United States Population	% change from previous census
2015	82,278	1.17%	1,032,949	4.40%	321,418,820	4.10%
2010	81,327	1.2%	989,415	9.67%	308,745,538	9.71%
2000	80,357	3.4%	902,190	12.91%	281,424,602	13.15%
1990	77,691	-3.7%	799,065	1.57%	248,709,873	9.79%
1980	80,696	-1.4%	786,690	13.29%	226,542,199	11.43%
1970	81,804	11.4%	694,409	2.91%	203,302,031	13.37%

Source: U.S. Census Bureau, 2016

Cascade County has experienced a low to moderate growth rate in recent years. The percentage of the population classified as "rural" is decreasing, as is the actual number of residents. Some areas of the county, specifically the area south of the City of Great Falls, south of the Town of Cascade and U.S. 89 from Manchester to Simms, are feeling development pressures, as people are moving out of Great Falls (Cascade County Growth Policy, 2014).

The Montana Census and Economic Information Center predicts that Cascade County's population will increase to 95,371 in the next 10 years (2027) and 96,442 in the next 20 years (2037). However,

the population has gotten older. The percent of population age 65 and older was 13.4 percent in 1997, 15.3 percent in 2007, and 17.2 percent in 2017.

Great Falls, the county seat, is the state's third largest city, with a population of 59,638 individuals (2015 estimate). Great Falls accounts for 72.4 percent of Cascade County's total population. **Table 3.4-2** presents population statistics for Great Falls, Belt, Cascade, and Neihart, the incorporated communities in Cascade County.

Table 3.4-2. Cascade County Incorporated Community Population Trends

Incorporated Community	1980	% Change Since Last Census	1990	% Change Since Last Census	2000	% Change Since Last Census	2010	% Change Since Last Census	2015	% Change Since Last Census
Great Falls, city	56,884	-5.6%	55,125	-3.2%	56,690	2.7%	58,505	3.1%	59,638	1.94%
Belt, town	825	20.5%	571	-44.5%	633	9.8%	597	-6.0%	596	-0.17%
Cascade, town	773	7.6%	729	-6.0%	819	11%	685	-19.6%	696	1.61%
Neihart, town	91	-19.8%	53	-71.7%	91	41.8%	51	-78.4%	51	0%

Source: U.S. Census Bureau, 2016

Great Falls and Cascade County have shared a somewhat comparable growth pattern throughout the years. The City's highest population was 60,091 in 1970, and if current growth rates continue, the City is set to surpass the previous highest population. This possibility is, in part, because the City has experienced a steady growth rate since 2000, actually growing 3.2 percent from that time.

3.5 Housing Stock

The U.S. Census estimates in their *2010-2014 American Community Survey* that Cascade County had 37,454 housing units with a median value of \$159,900. A further breakdown of the housing units from the census is presented in **Table 3.5-1**. The housing data suggests that over 55 percent of the homes in Cascade County were constructed in 1969 or earlier and only 20 percent of the housing stock has been constructed since 1990.

Table 3.5-1. U.S. Census Housing Data; Cascade County

Category	Cascade County	Great Falls, City	Belt, Town	Cascade, Town	Neihart, Town
Total Number of Housing Units	37,454	27,062	314	306	162
Median Value Housing Units (2010-2014)	\$159,900	\$158,900	\$93,000	\$128,300	\$109,700
Year Structure Built					
2010 or later	390	138	0	0	4
2000 to 2009	3,742	2,061	4	13	20
1990 to 1999	3,509	2,051	17	21	11
1980 to 1989	2,699	1,765	21	18	6
1970 to 1979	6,311	4,230	67	41	22
1960 to 1969	6,118	5,018	28	42	27
1950 to 1959	5,402	4,685	39	48	4
1940 to 1949	3,159	2,449	20	48	16
1939 or earlier	6,124	4,665	118	75	52

Source: U.S. Census Bureau, 2016.

The housing stock in Great Falls and Cascade County, including all occupied or vacant but habitable housing units, has experienced some sizable changes in recent decades. From 1970 to 2010, the number of units in the city increased by 38 percent while the county's housing stock grew by 44 percent during this same period. Included in the county's housing stock numbers are 1,406 units located at Malmstrom Air Force Base.

3.6 Economy and Socioeconomics

The City of Great Falls is the largest city in north central Montana encompassing over 20 miles. As such, the City serves as the financial, trade, health care and transportation center - the hub of the region. Rural residents in surrounding communities may travel to the City once a month to buy goods, obtain services or receive medical treatment, augmenting the Great Falls-area economy.

The economy of Great Falls and Cascade County is tied closely to two primary economic sectors: military spending and agricultural production. By their very nature, these two sectors produce a kind of "up and down" economy. The local economy relies heavily on agricultural production and serves a large agricultural trade area for retailing and wholesaling, as well as providing trade, health, and financial services. Major employment sectors in the City are Benefis Health Care and the Great Falls Clinic, while the County's employment base tends to be more agricultural-based with the major exception of Malmstrom Air Force Base.

The top private employers in Cascade County in 2011, reported by the Montana Department of Labor and Industry are: Benefis Hospital (500 to 999 employees); National Electronics Warranty and Wal-Mart (500 to 999 employees); Benefis Healthcare, Easter-Seals-Goodwill and Great Falls Clinic (100 to 249 employees); Albertsons, Optimum, Centene Corp., Center for Mental Health, DA Davidson & Co., McDonald's, Missouri River Manor, North Central Independent Living, Opportunities, Inc., Peak Health and Wellness Center, Quality Life Concepts, Sam's Club, Town Pump, and University of Great Falls (100 to 249 employees).

Table 3.6-1 presents economic indicators for Cascade County, the City of Great Falls, and Towns of Belt, Cascade and Neihart, from 2011 to 2015.

Table 3.6-1. Economic & Socioeconomic Data; Cascade County

Indicator	State of Montana	Cascade County	Great Falls, City	Belt, Town	Cascade, Town	Neihart, Town
Per capita income	\$26,381	\$25,870	\$26,268	\$23,740	\$21,255	\$28,742
Median household income	\$47,169	\$45,205	\$42,896	\$36,765	\$40,774	\$46,250
Persons living below poverty level	14.6%	15.3%	17.4%	23.3%	20.3%	5.6%

Source: U.S. Census, 2016

3.7 Land Use and Future Development

Land use in Great Falls is predominantly urban whereas the rest of Cascade County is primarily agricultural, pasture and range lands with pockets of rural residential and transitional urban development. The City has expanded its boundaries geographically, approximately 66 percent, or approximately 14,000 acres, during the last fifty years. The primary land use in the Towns of Cascade, Belt, and Neihart is single family residential. These communities also consist of limited

commercial and civic/governmental uses. Steady growth is anticipated in the Great Falls area while growth in the remainder of the county is anticipated to be limited.

3.7.1 Land Use Implementation Tools

Industrial, commercial and residential land use is managed with zoning and subdivision regulations in accordance with guidelines set forth in County, City, and Town growth policies. These documents recognize natural hazards require regulations to ensure safe growth. Building codes also play an important role to ensure structures are constructed to safety standards.

Growth Policies

Cascade County, the City of Great Falls, and Towns of Cascade and Neihart use growth policies to guide decisions about land use. These documents analyze and summarize community-wide issues and trends in order to recommend broad goals, objectives, and policies to manage long-range growth. The Town of Belt does not currently have a growth policy.

The current Cascade County Growth Policy Plan was adopted in 2014. The guiding principles of the Plan include sustaining and strengthening the economic well-being of the county's citizens, protecting and maintaining the rural character and interrelationship with the natural environment and resources, maintaining the agricultural economy, retaining the presence of the U.S. military, and preserving and enhancing the rural, friendly, and independent lifestyle of the county's citizens.

The Cascade County Growth Policy recognizes the hazards associated with transportation and wildfire and includes the following policies that support hazard mitigation:

- Promote and maintain a transportation system then provides safety, efficiency, and is cost effective.
- Minimize risk of fire by management and planning, and to permit the effective and efficient suppression of fires in order to protect persons, property and forested areas.
 - Encourage fire protection measures throughout the county, giving special emphasis to the extreme fire hazards at the wild land/urban interface.
 - Subdivisions should be planned, designed, constructed and maintained so as to minimize the risk of fire. Developers should submit a defensible space plan for each subdivision to the appropriate fire district for its review.
 - Encourage fire resistant construction materials and the use of sprinkler systems.
 - Promote cooperation with local fire districts and state and federal agencies to develop and provide a wildfire educational program.
 - Promote fire services for all subdivisions.
 - Promote adequate water supply systems.
 - Support adequate ingress and egresses in all subdivision planning.
 - Promote vegetation policies that reduce fire hazards.

The Cascade County Growth Policy identifies *Flood Hazard Evaluation Restrictive Development Areas* of as those areas adjoining a watercourse or drainage way, which would be covered by the floodwater of a flood of 100-year flood, as delineated on FEMA's Floodway Boundary Maps. These areas are

intended to contain potential floodplains where it is necessary and desirable to review and determine any non-agricultural or non-open space uses, structures, or activities because of safety hazards from floods; financial burdens imposed upon the county through rescue and relief efforts caused by the occupancy of areas subject to flooding; potential loss of life, property damage and losses or risks associated with flood conditions; and, the potential loss of the location, character and extent of natural drainage courses.

The Great Falls Growth Policy (2013) recognizes the wildfire hazard and intends to coordinate with the County on issues related to urban and rural interface uses and the accompanying threat of wildfire. Regarding flooding, the city growth policy indicates that the floodplain ordinance has recently been updated and there is floodplain zoning regulations in effect.

The Great Falls Growth Policy acknowledges the role of emergency response and preparedness in mitigating the hazards that range from wildfires, flooding, to a train derailment or a pandemic influenza outbreak. They support the continuation of emergency planning into the future.

Town of Cascade Growth Policy (2011) indicates the town is not subjected to impacts from natural hazards such as extended periods of flooding (except for occasional ice damming on the Missouri river) or frequent high wind velocities, and earthquake potential is a minor concern for construction of public buildings and facilities. The growth policy recognizes the flooding and wildfire hazards and supports hazard mitigation with the following goals and policies:

- Development in environmentally sensitive areas including 100-year floodplain and on steep slopes may pose inherent development limitations and design should be managed to avoid and mitigate environmental impacts and natural hazards. Filling of the 100-year floodplain should be avoided.
- Protect the 100-year floodplain through implementation of the Federal Flood Insurance Program for both the City and the County.
- In the rural area, apply and enforce the Fire Protection Guidelines for Wildland Residential Interface Development adopted by the State, including defensible space, road access, water supply, building materials, and building density and spacing.
- All new developments of five lots or more (or additions to existing developments which total five lots or more) should provide hydrants or a system of recharging fire tankers acceptable to the local fire district. Where these are not feasible or acceptable, a cash payment equivalent to the cost of a tanker recharge facility should be paid to the District to assist the District in acquiring tanker and response equipment. Loop roads are encouraged over cul-de-sacs in order to provide secondary access, particularly in areas at high risk from wildfire.

The Town of Neihart Growth Policy (2016) recognizes the flood and wildfire hazards. Some of the town is located in the flood hazard zone associated with Belt Creek and the Town plans to develop a map that more accurately defines areas for potential growth, considering all constraints and opportunities including floodplain issues. Forest fires are a significant concern for the Neihart community, exacerbated at this time, as there is not enough storage capacity in the water system for fire protection. The Town plans to encourage property owners to implement a defensible space around structures, by supporting tree removal efforts. They also support upgrades to the public water system to help meet fire suppression needs, by pursuing grant and other funding opportunities and consider rate increases.

Zoning Regulations

Zoning is a tool used by local government to control and direct land use in communities, in order to protect the public health, safety and welfare. Zoning ordinances regulate where future growth should or should not be allowed. Cascade County and the City of Great Falls have zoning regulations. The Towns of Belt, Cascade and Neihart do not currently have zoning. The Town of Cascade plans to adopt zoning regulations in the near future after their Growth Policy Update is passed.

Cascade County adopted updated zoning regulations in 2016. These regulations establish 12 zoning districts and include residential, industrial, agricultural, general business, mixed-use, open space, planned unit development zones, and the Flood Road Zoning District for the Woodland Estates area. The City of Great Falls has a land development code that describes the allowable uses within zoning districts.

Subdivision Regulations

In contrast to zoning which regulates how existing lots may be used and developed, subdivision regulations govern the division of raw land into building lots. They typically identify areas with physical limitations that may not be suitable for development unless the hazards are eliminated or will be overcome by approved design and construction techniques.

Cascade County and the City of Great Falls control development through the use of subdivision regulations. The county's subdivision regulations state that all subdivisions must be designed so that potentially significant adverse impacts to public health and safety have been avoided or reasonably minimized. Among other things, public health and safety is defined as: flooding, fire or wildfire hazards, rock falls or landslides, unstable soils, steep slopes, and other natural hazards; and air or vehicular traffic safety hazards. The Towns of Belt, Cascade, and Neihart use the County's subdivision regulations.

Flooding:

- All portions of a proposed subdivision located in a regulated floodplain of a perennial stream as defined in the Cascade County Floodplain Regulations and/or Flood Insurance Rate Maps (FIRM), shall not be subdivided for any non-agricultural or non-open space uses, structures, or activities. These areas shall be designated as individual lots and shall require a re-zone as Open Space.
- If any portion of a proposed subdivision is within 2,000 horizontal feet and 20 vertical feet of a live stream draining an area of 25 square miles or more, and no official floodway delineation or floodway studies of the stream have been made, the applicant shall, through the appropriate local, state, and federal agencies, conduct a flood hazard evaluation, including the calculated 100 year frequency water surface elevations and the 100 year floodplain boundaries.

Wildfire - Areas rated as extreme, high or medium wildland urban interface (WUI) must comply with special design standards including:

- Access and Evacuation – Roadside vegetation must be maintained so roads will serve as escape routes and fire breaks. There must be a minimum of two approach routes to ensure more than one escape route and access routes by emergency vehicles. Building Density Requirements - Densities in areas of steep slopes and/or dense forest growth shall be reduced through minimum lot standards.

- **Vegetation Management** - A vegetation management plan is required that will reduce fuel loading and hazard rating and provide continuous maintenance of the fuel load. The plan must include guidelines for defensible space, fuel breaks and greenbelts, and a plan for continuous maintenance.
- **Water Supply** – A fire-fighting water source and access to that source must exist and be maintained as defensible space. Requirements for water supply systems are stipulated and may include fire hydrants or storage tanks.
- **Fire Protection Covenants** are required stipulating that property owners must maintain fire protection water supplies and fire protection systems (defensible spaces, driveway routes, fuel breaks) in perpetuity.

The City of Great Falls subdivision regulations have a section on fire protection that includes completing a Fire Protection Plan. This plan must address access, ingress, egress and evaluation; fuel modification; water supply, construction, location, and design of structures; ignition potential of structures; asset protection zones (defensible space); adequate fire protection facilities for the project; adequate signage for location by fire personnel; and response agency and approximate response time. The regulations provide standards for all of these items.

Building Codes

Building codes are also a tool to control future development. The main purpose of building codes are to protect public health, safety and general welfare as they relate to the construction and occupancy of buildings and structures. They comprise a set of rules that specify the minimum acceptable level of safety for buildings and often contain requirements for snow and wind loads, roof construction, and seismic risk. Building codes are generally intended to be applied by architects and engineers, but are also used by building inspectors. Building codes have been adopted and are enforced in the City of Great Falls and include the International Building Code, International Residential Code and International Existing Building Code. Cascade County does not have a building department and therefore, does not enforce building codes. The Towns of Belt, Cascade and Neihart also do not enforce building codes.

Floodplain Regulations

Recurrent flooding of land resources causes loss of life, damage to property, disruption commerce and governmental services, and unsanitary conditions. These are all detrimental to the health, safety, welfare, and property of the occupants of flooded lands and the people of Cascade County. It is in the public interest to manage regulation of flood prone lands and waters in a manner consistent with sound land and water use management practices which will prevent and alleviate flooding threats to life and health and reduce private and public economic losses.

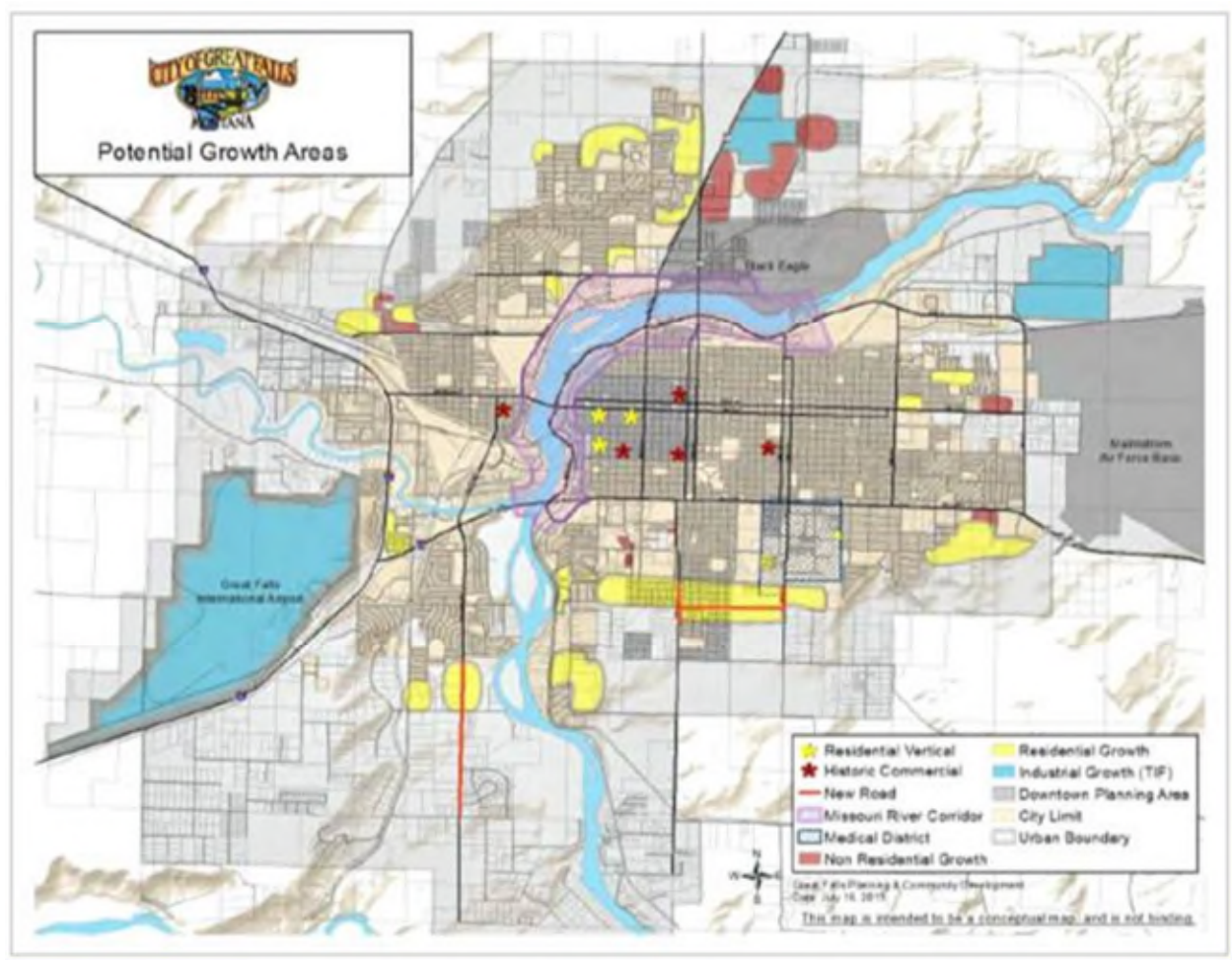
The floodplain of the major streams, as well as its tributary streams, can present a serious obstacle to many types of development, and would necessarily be considered a constraint to the expansion of residential and commercial uses where flooding conditions exist. Digital Flood Insurance Rate Maps (DFIRMs) were prepared for flood-prone areas within the Great Falls and Cascade County in 2013. This resulted in the jurisdictions adopting updated floodplain regulations to improve overall floodplain management. The new DFIRMs provides citizens, staff and the communities a comprehensive approach to disaster mitigation planning, economic development and emergency

response. Builders, existing property owners and developers now have updated information for making well-informed decisions on where to build, how they can affect the properties within flood prone areas and property owners flood insurance rates. Insurance agents and lending institutions can use the updated information to manage existing and future risks. Floodplain regulations are amended periodically to stay current with statutory amendments or other relevant changes. The County currently has two letters of official flood map revision; a Letter of Map Amendment (LOMA) and a Letter of Map Revision (LOMR).

Cascade County, the City of Great Falls, and the Towns of Belt, Cascade, and Neihart participate in the National Flood Insurance Program (NFIP).

3.7.2 Future Development

Slow steady growth is anticipated in the Great Falls area while growth in the remainder of the county is anticipated to be limited. The City of Great Falls Growth Policy identifies several areas expected to see future development, as shown in the map below.



The map illustrates logical areas for future development based on the existing infrastructure and development pattern. In addition, the map illustrates two road projects that are currently in the *Transportation Improvement Plan*. This map also shows the three industrial Tax Increment Finance Districts in the City. Anticipated residential development is shown in yellow. Possible mixed-use areas as well as other potential non-residential development areas are shown in red. The *Downtown Master Plan*, *Medical District* and the *Missouri River Urban Corridor Plan* boundaries are also highlighted. These planning areas have the potential to maximize their location-related advantages by developing more mixed-use projects along with residential development.

A large portion of Neihart area is undevelopable due to its location in a mountainous valley and location in the Belt Creek floodplain. Further restrictions to possible growth of the community stem from the lack of a public waste water facility.

Section 4.10 presents a hazard analysis of the proposed future development projects in Cascade County.

SECTION 4. RISK ASSESSMENT AND VULNERABILITY ANALYSIS

Cascade County is exposed to many hazards both natural and man-made. A risk assessment and vulnerability analysis was completed to help identify where mitigation measures could reduce loss of life or damage to property in the County City of Great Falls, and Towns of Belt, Cascade, and Neihart.

This section includes a description of the risk assessment methodology and a hazard profile for eight hazards organized from high to low by county priority: hazardous material incidents, wildfire, severe weather and drought, communicable disease, transportation accidents, flooding and dam failure, terrorism, and cyber security. The section is concluded with a risk assessment summary and discussion on the location of future development projects. Supporting documentation is presented in **Appendix C**.

4.1 Risk Assessment Methodology

A risk assessment was conducted to address requirements of the DMA 2000 for evaluating the risk to Cascade County from natural and man-made hazards. DMA 2000 requires measuring potential losses to critical facilities and property resulting from natural hazards by assessing the vulnerability of these facilities to natural hazards. In addition to the requirements of DMA 2000, the risk assessment approach taken in this study evaluated risks to vulnerable populations and also examined the risk presented by several man-made hazards. The goal of the risk assessment process is to determine which hazards present the greatest risk and what areas are the most vulnerable to hazards.

The risk assessment approach used for this plan entailed using geographic information system (GIS) software and data to develop vulnerability models for people, structures, critical facilities, and evaluating those vulnerabilities in relation to hazard profiles that model where hazards exist. This type of approach to risk assessment is dependent on the detail and accuracy of the data used during the analysis. Additionally, some types of hazards are extremely difficult to model. Data limitations are described in *Section 4.1.7*.

4.1.1 Critical Facilities and Building Stock

Critical facilities were mapped using coordinates provided by Cascade County. Mapping of these facilities allowed for the comparison of their location to the hazard areas where such hazards are spatially recognized. Construction type of critical facilities (e.g. steel, wood, masonry, etc.) has not been compiled and was therefore, not considered in the analysis. This data should be collected for future updates of this plan. Critical facility values were obtained, where readily available, from municipal departments. Many values were estimated based on similar structures in other counties where values were available.

Infrastructure, including bridges, water and wastewater facilities, and communication sites had digital mapping available and were therefore included in the analysis. Replacement values of critical facilities were used in the risk assessment where this information was readily available from the

Section 4: Risk Assessment and Vulnerability Analysis

County, City and Towns and Montana Cadastral Mapping Program. **Figures 3 through 3E** present the location of critical facilities in Cascade County, Great Falls, Belt, Cascade, and Neihart, as well as several unincorporated communities.

Bridge data was obtained from the Montana Natural Resource Information System (NRIS) and the National Bridge Inventory. Bridge replacement values were extrapolated using unit costs (developed by Lewis and Clark County) for span length and width. **Figure 4** presents the bridge locations in Cascade County. The Critical Facility section in **Appendix C** presents a key to the bridge inventory. Cascade County may wish to enhance the bridge data for the 2022 MHMP update by adding the major culverts in the county.

Building stock data was obtained from the NRIS structures database and Montana Department of Revenue's (MDOR) cadastral mapping program. The NRIS structures data recognizes land parcels and provides spatial locations of structures within each parcel with a distinction between residential and other property types. Appraised building values are available on the parcel level from the MDOR cadastral mapping program. The NRIS structures shapefile was linked to the MDOR cadastral database to obtain building values for structures within each parcel. Building exposure in the risk assessment is presented for Cascade County, Great Falls, Belt, Cascade, and Neihart.

4.1.2 Vulnerable Population

Population at risk in the hazard areas was estimated using GIS and data from the U.S. Census Bureau. Vulnerable (at-risk) population was calculated by intersecting the hazard shapefile (described in *Sections 4.2, 4.3, and 4.7*, for Hazardous Materials, Wildfire, Flooding, and Dam Failure hazards, respectively) with the NRIS structures shapefile and then computing population using estimates from the 2010 U.S. Census that 2.35 individuals reside in each structure, 22.5 percent of whom are under age 18 and 17.4 percent of whom are over the age of 65. This method of estimating vulnerable population is most appropriate when hazard areas are small (flooding) or linear (haz-mat).

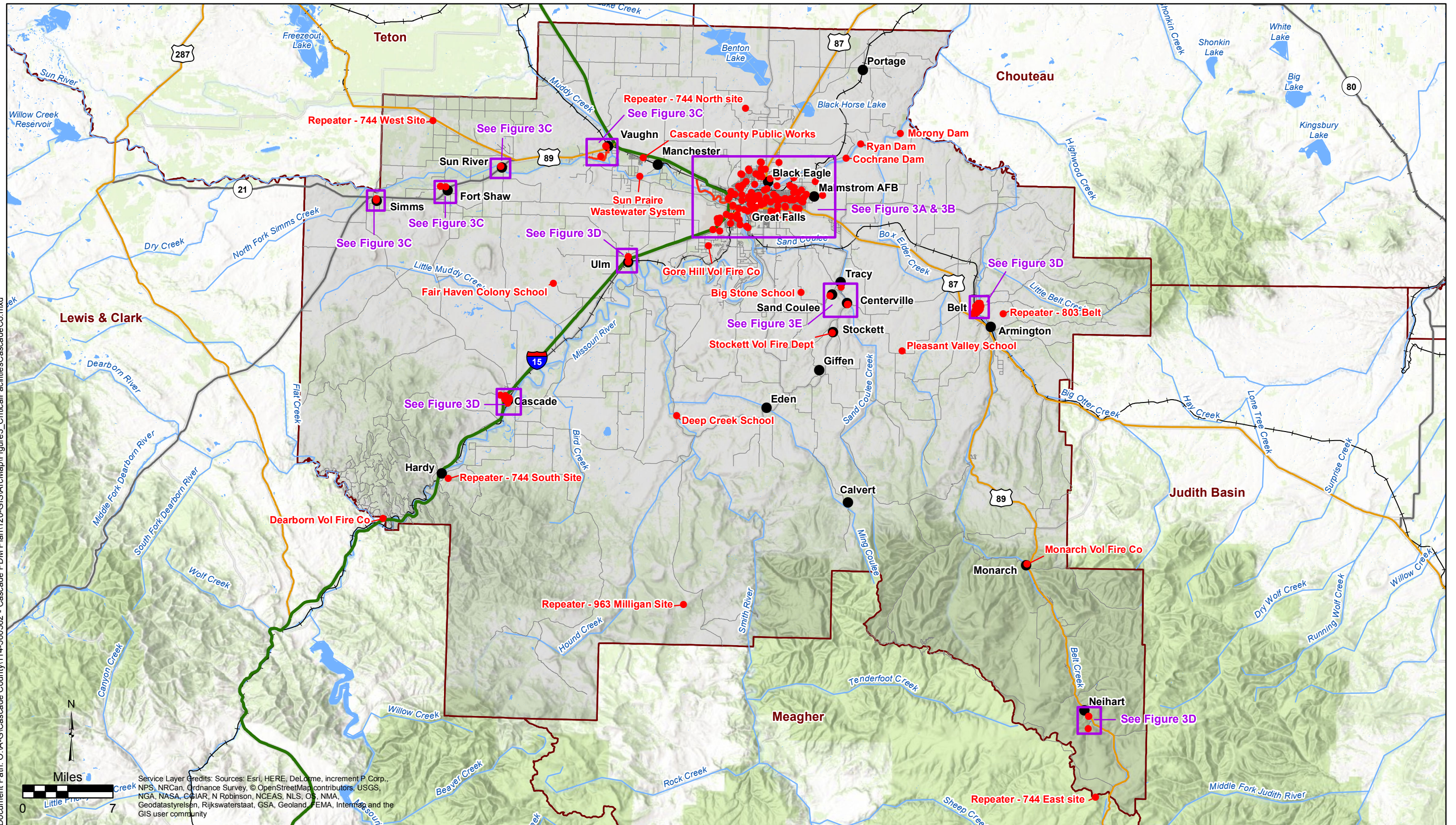
This method of estimating vulnerable population assumes that all structures identified in the NRIS structures database are occupied, and that all structure types are occupied in accordance with residential estimates. This method could lead to over-reporting vulnerable populations where seasonal-use structures exist (Neihart), or under-reporting vulnerable population where more than 2.35 people reside in each structure (County, Great Falls, Belt and Cascade). A comparison of actual population data from the 2010 U.S. Census versus vulnerability analysis estimating methods used for the MHMP is presented in **Table 4.1-1**.

Table 4.1-1. Population Comparison: 2010 Census vs. Vulnerability Analysis Methodology

Jurisdiction	U.S. Census (2010) Population	Vulnerability Analysis Method Population Estimate
Cascade County (balance)	20,346	17,629
City of Great Falls	59,638	51,669
Town of Belt	596	230
Town of Cascade	696	613
Town of Neihart	51	148

Note: MHMP Vulnerability Analysis Method used to estimate vulnerable population in hazard area utilizing number of structures from NRIS structures database and multiplying number of structures by 2.35 persons (U.S. Census Bureau estimate of number of persons residing in each structure).

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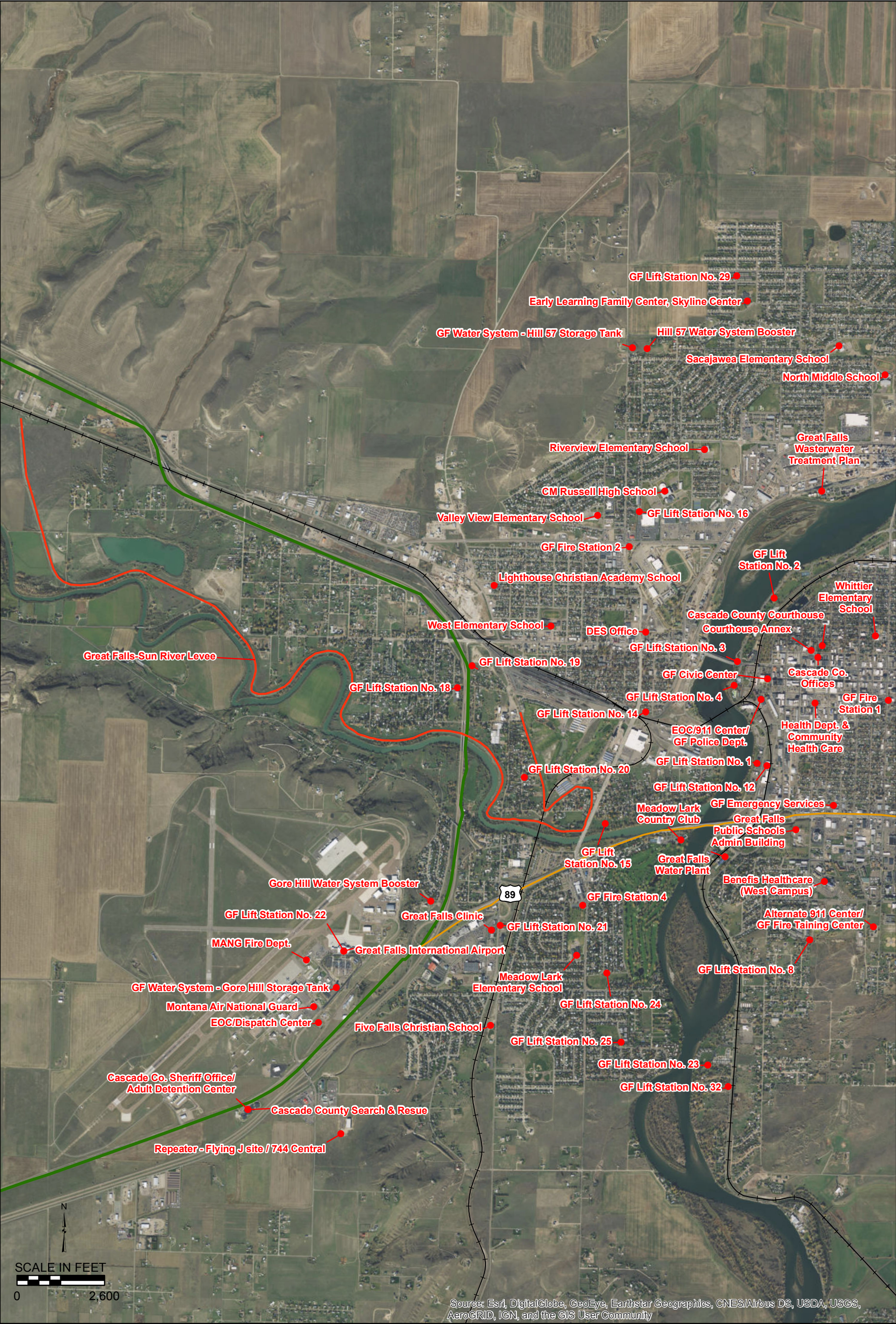
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Legend

- | | | | | |
|---------------------------|---------------|-------------------|------------------|-------------------|
| ● Critical Facility | ● Place | — Interstate | — Other Route | — River/Stream |
| — Levee Critical Facility | ○ County Seat | — U.S. Highway | — Railroad | — County Boundary |
| | | — Montana Highway | — Lake/Reservoir | |

Figure 3
Critical Facilities
Cascade County, Montana
Multi-Hazard Mitigation Plan





Date: 3/17/2017



Legend

- | | | |
|---------------------------|----------------|-------------------|
| ● Critical Facility | — Interstate | — Montana Highway |
| — Levee Critical Facility | — U.S. Highway | — Railroad |

Figure 3B
Critical Facilities
Great Falls East
Cascade County, Montana
Multi-Hazard Mitigation Plan



Date: 3/15/2017



Legend

- Critical Facility
- Levee Critical Facility

Figure 3C
Critical Facilities
Simms, Fort Shaw, Sun River, and Vaughn
Cascade County, Montana
Multi-Hazard Mitigation Plan

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Date: 3/10/2017



Legend

● Critical Facility

Figure 3D
Critical Facilities
Cascade, Ulm, Belt, and Neihart
Cascade County, Montana
Multi-Hazard Mitigation Plan

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Date: 3/10/2017

Figure 3E

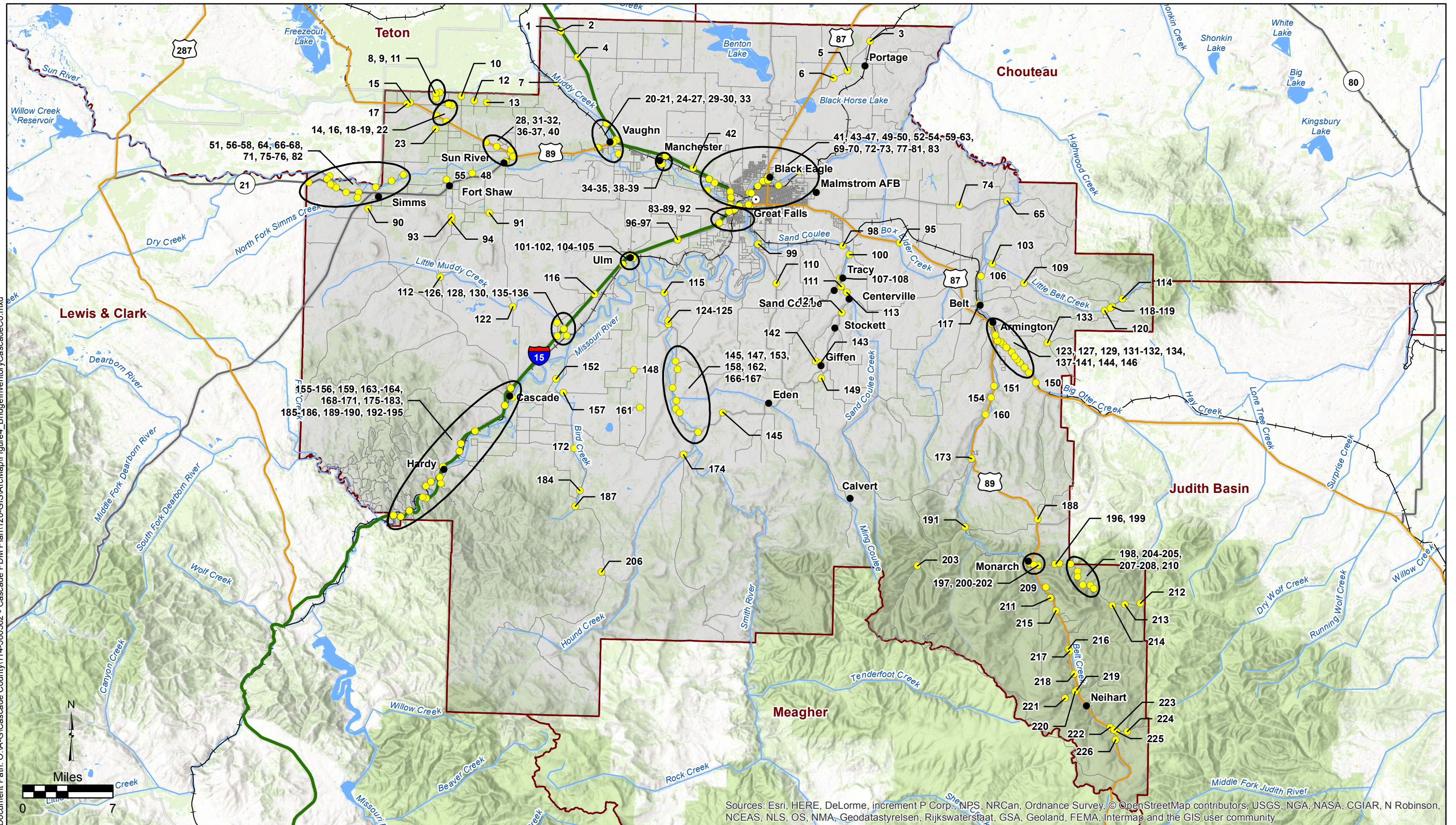
**Sand Coulee and Centerville
Cascade County, Montana
Multi-Hazard Mitigation Plan**

Legend

- Critical Facility
- Place



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*Bridges sequentially numbered based on latitude coordinate with 1 being the northernmost bridge.

Legend

- | | | | |
|---------------|-------------------|---------------|-------------------|
| ● Place | — Interstate | — Other Route | — Lake/Reservoir |
| ○ County Seat | — U.S. Highway | — Railroad | — River/Stream |
| ● Bridge* | — Montana Highway | | — County Boundary |

Figure 4
Bridge Inventory
Cascade County, Montana
Multi-Hazard Mitigation Plan

4.1.3 Hazard Identification

The 2011 Cascade County PDM Plan (Tetra Tech, 2011) identified eight hazards affecting Cascade County and the incorporated communities including: wildfire, structure fire, severe summer weather, hazardous material incidents, transportation accidents, severe winter weather, flooding/flash floods/levee failure, and dam failure. These hazards were reviewed for the 2017 PDM update by the Planning Team who considered what other hazards might be of consequence since development of the original PDM Plan.

Hazards profiled in the 2017 update include those from the 2011 PDM Plan with the following changes: flooding and dam failure are combined into one hazard profile; severe summer and severe winter weather are combined into one hazard profile along with drought; and, new hazards include communicable disease, terrorism, and cyber security. Hazards carried forward to the 2017 MHMP include wildfire, hazardous material incidents, and transportation accidents. The Planning Team decided that several hazards should be de-emphasized in the 2017 MHMP because they either effect only a small segment of the population and/or occur infrequently with little damage, including; structure fire and earthquake.

4.1.4 Hazard Profiles

Hazard profiles were prepared for each of the identified hazards and are presented within this section according to their prioritized rank (see *Plan Section 4.1.6*). The level of detail for each hazard is generally limited by the amount of data available.

Each hazard profile contains a description of the hazard and the history of occurrence, the vulnerability and area of impact, the probability and magnitude of future events, and an evaluation of how future development is being managed to reduce risk. The methodology used to analyze each of these topics is further described below.

Description and History

A number of databases were used to describe and compile the history of hazard events profiled in this plan. This data was supplemented by input from the public, local officials, newspaper accounts, and internet research. The two primary databases used included the National Climatic Data Center (NCDC) Storm Events Database and Spatial Hazard Events and Losses Database for the United States (SHELDUS).

The NCDC Storm Events database receives Storm Data from the National Weather Service. The NWS receives their information from a variety of sources, including county, state and federal emergency management officials, local law enforcement officials, skywarn spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public. Storm Data is an official publication of the National Oceanic and Atmospheric Administration (NOAA) which documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce.

SHELDUS is a county-level hazard data set for the United States for 18 different natural hazard event types. For each event, the database includes the date, location, property losses, crop losses, injuries, and fatalities that affected each county. The database includes every loss-causing and/or deadly

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event between 1960 through 1975 and from 1995 onward. Between 1976 and 1995, SHELUDS reflects only events that caused at least one fatality or more than \$50,000 in property or crop damages.

Vulnerability and Area of Impact

Vulnerabilities are described in terms of critical facilities, structures, population, and socioeconomic values that can be affected by the hazard event. Hazard impact areas describe the geographic extent to which a hazard can impact a jurisdiction and are uniquely defined on a hazard-by-hazard basis. Mapping of the hazards, where spatial differences exist, allows for hazard analysis by geographic location. Some hazards can have varying levels of risk based on location. Other hazards cover larger geographic areas and affect the area uniformly.

Probability and Magnitude

Probability of a hazard event occurring in the future was assessed based on hazard frequency over a 100 year period. Hazard frequency was based on the number of times the hazard event occurred divided by the period of record. If the hazard lacked a definitive historical record, the probability was assessed qualitatively based on regional history and other contributing factors. Probability was broken down as follows:

- Highly Likely – greater than 1 event per year (frequency greater than 1).
- Likely – less than 1 event per year but greater than 1 event every 10 years (frequency greater than 0.1 but less than 1).
- Possible – less than 1 event every 10 years but greater than 1 event every 100 years (frequency greater than 0.01 but less than 0.1).
- Unlikely – less than 1 event every 100 years (frequency less than 0.01)

The magnitude or severity of potential hazard events was evaluated for each hazard. Magnitude is a measure of the strength of a hazard event and is usually determined using technical measures specific to the hazard. Magnitude was calculated for each hazard where property damage data was available. Magnitude is expressed as a percentage according to the following formula:

- $(\text{Property Damage} / \text{Number of Incidents}) / \$ \text{ of Building Stock Exposure}$

Future Development

The impact to future development was assessed based on potential opportunities to limit or regulate development in hazardous areas such as zoning and subdivision regulations. The impacts were assessed through a narrative on how future development could be impacted by the hazard. Plans, ordinances and/or codes currently in place were identified that could be revised to better protect future development in Cascade County from damage caused by natural and man-made hazards.

Climate Change

An essential aspect of hazard mitigation is predicting the likelihood of hazard events in a planning area. Typically, predictions are based on statistical projections from records of past events. This approach assumes that the likelihood of hazard events remains essentially unchanged over time. Thus, averages based on the past frequencies of, for example, floods are used to estimate future

frequencies: if a river has flooded an average of once every 5 years for the past 100 years, then it can be expected to continue to flood an average of once every 5 years.

For hazards that are affected by climate conditions, the assumption that future behavior will be equivalent to past behavior is not valid if climate conditions are changing. As flooding is generally associated with precipitation frequency and quantity, for example, the frequency of flooding will not remain constant if broad precipitation patterns change over time. Specifically, as hydrology changes, storms currently considered to be a 1-percent-annual-chance event (100-year floods) might strike more often, leaving many communities at greater risk. The risks of, landslide, severe storms, extreme heat and wildfire are all affected by climate patterns as well. For this reason, an understanding of climate change is pertinent to efforts to mitigate natural hazards. Information about how climate patterns are changing provides insight on the reliability of future hazard projections used in mitigation analysis.

At the end of each hazard profile in this section is a discussion on climate change. The information provides insight on how the hazard may be impacted by climate change and how these impacts may alter current exposure and vulnerability for the people, property, and critical facilities.

4.1.5 Hazard Ranking and Priorities

In ranking the hazards, the Planning Team completed a Calculated Priority Risk Index (CPRI) Work Sheet. The CPRI examines four criteria for each hazard (probability, magnitude/severity, warning time, and duration); the risk index for each according to four levels, then applies a weighting factor (**Table 4.1-2**). The result is a score that has been used to rank the hazards. Each hazard profile presents its CPRI score with a cumulative score sheet included in **Appendix C. Table 4.1-3** presents the results of the CPRI scoring for all hazards.

Table 4.1-2. Calculated Priority Risk Index

CPRI Category	Degree of Risk			Assigned Weighting Factor
	Level ID	Description	Index Value	
Probability	Unlikely	<ul style="list-style-type: none"> Rare with no documented history of occurrences or events. Annual probability of less than 0.01. 	1	45%
	Possibly	<ul style="list-style-type: none"> Infrequent occurrences with at least one documented or anecdotal historic event. Annual probability that is between 0.1 and 0.01. 	2	
	Likely	<ul style="list-style-type: none"> Frequent occurrences with at least two or more documented historic events. Annual probability that is between 1 and 0.1. 	3	
	Highly Likely	<ul style="list-style-type: none"> Common events with a well documented history of occurrence. Annual probability that is greater than 1. 	4	
Magnitude/Severity	Negligible	<ul style="list-style-type: none"> Negligible property damages (less than 5% of critical and non-critical facilities and infrastructure). Injuries or illnesses are treatable with first aid and there are no deaths. Negligible quality of life lost. Shut down of critical facilities for less than 24 hours. 	1	30%
	Limited	<ul style="list-style-type: none"> Slight property damages (greater than 5% and less than 25% of critical and non-critical facilities and infrastructure). Injuries or illnesses do not result in permanent disability and there are no deaths. Moderate quality of life lost. Shut down of critical facilities for more than 1 day and less than 1 week. 	2	
	Critical	<ul style="list-style-type: none"> Moderate property damages (greater than 25% and less than 50% of critical and non-critical facilities and infrastructure). Injuries or illnesses result in permanent disability and at least one death. Shut down of critical facilities for more than 1 week and less than 1 month. 	3	
	Catastrophic	<ul style="list-style-type: none"> Severe property damages (greater than 50% of critical and non-critical facilities and infrastructure). Injuries or illnesses result in permanent disability and multiple deaths. Shut down of critical facilities for more than 1 month. 	4	
Warning Time	Less than 6 hours	Self explanatory.	4	15%
	6 to 12 hours	Self explanatory.	3	
	12 to 24 hours	Self explanatory.	2	
	More than 24 hours	Self explanatory.	1	
Duration	Less than 6 hours	Self explanatory.	1	10%
	Less than 24 hours	Self explanatory.	2	
	Less than one week	Self explanatory.	3	
	More than one week	Self explanatory.	4	

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Table 4.1-3. Calculated Priority Ranking Index Summary; Cascade County

Hazard	Probability	Magnitude/Severity	Warning Time	Duration	CPRI Score
Hazardous Material Incidents	Highly likely	Critical	< 6 hours	> 1 week	3.70
Wildfire	Highly likely	Critical	< 6 hours	> 1 week	3.70
Railroad Accidents	Highly likely	Critical	< 6 hours	> 1 week	3.70
Communicable Disease	Highly likely	Catastrophic	12 - 24 hours	> 1 week	3.70
Cyber Security	Likely	Catastrophic	< 6 hours	> 1 week	3.55
Highway Accidents (Mass Casualty)	Highly likely	Critical	< 6 hours	< 24 hours	3.50
Aircraft Accidents	Likely	Critical	< 6 hours	< 1 week	3.15
Severe Summer Weather	Highly likely	Limited	< 6 hours	< 6 hours	3.10
Structure Fire	Likely	Critical	< 6 hours	< 24 hours	3.05
Terrorism, Violence, Civil Unrest	Possible	Catastrophic	< 6 hours	< 1 week	3.00
Severe Winter Weather	Highly likely	Limited	>24 hours	< 1 week	2.85
Floods, Ice Jams, Flash Flooding	Likely	Critical	>24 hours	> 1 week	2.80
Dam Failure, Levee Failure	Possible	Catastrophic	>24 hours	> 1 week	2.65
Drought	Likely	Limited	>24 hours	> 1 week	2.50
Earthquake	Possible	Limited	< 6 hours	< 24 hours	2.30
Landslide	Unlikely	Negligible	< 6 hours	< 6 hours	1.45
Avalanche	Unlikely	Negligible	< 6 hours	< 6 hours	1.45
Volcanic Ash	Unlikely	Negligible	>24 hours	< 1 week	1.20

The Calculated Priority Risk Index scoring method has a range from 0 to 4. "0" being the least hazardous and "4" being the most hazardous situation.

The Planning Team felt that with the CPRI ranking did not accurately represent Cascade County's priorities; therefore, the list of hazards was re-prioritized and several hazards were combined into one profile, as shown below. The remainder of this section contains the hazard profiles in this order.

- 1 – Hazardous Material Incidents (*Section 4.2*)
- 2 – Wildfire (*Section 4.3*)
- 3 – Severe Weather and Drought (*Section 4.4*)
- 4 – Communicable Disease (*Section 4.5*)
- 5 – Transportation Accidents (*Section 4.6*)
- 6 – Flooding and Dam Failure (*Section 4.7*)
- 7 – Terrorism, Flooding and Dam Failure (*Section 4.8*)
- 8 – Cyber Security (*Section 4.9*)

The Electro Magnetic Pulse (EMP) hazard was considered by the Planning Team for inclusion in the MHMP. EMP is a byproduct of nuclear radiation and is also caused by solar flares. EMP can take out power grids. Malmstrom Air Force Base (AFB) is currently evaluating this scenario and its potential impacts on Cascade County. Future updates of the MHMP may profile the EMP hazard.

Two hazards profiled in the 2011 PDM Plan were deemed low priority by the Planning Team (Structure Fire, Earthquake) because they effected only a localized segment of the population and/or occurred infrequently with little damage. Abbreviated profiles for these hazards are included in **Appendix C**.

4.1.6 Assessing Vulnerability – Estimating Potential Losses

The methodology used in the vulnerability analysis presents a quantitative assessment of the building stock, population, and critical facility exposure to the individual hazards. For hazards that

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are not uniform across the jurisdiction and instead occur in specific areas (e.g. hazardous material incidents, wildfire, flooding, dam failure, etc.) the hazard area factored into the loss estimation calculations. Building stock data, available from the NRIS structures database and MDOR cadastral mapping program was used in the analysis. Linking these two data sources enabled the location of structures within land parcels to be connected to their appraised value. Using GIS, hazard risk areas were intersected with the building stock data to identify the number of structures and exposure due to each hazard. Hazard risk areas were also intersected with critical facility data (including infrastructure such as water and wastewater systems) to determine the number and exposure of critical facilities to each hazard. A separate analysis was completed for Cascade County's bridges. Using the number of structures in each hazard area, vulnerable population was estimated by assigning U.S. Census estimates on number of persons residing in each structure, percent of population over age 65 years and under age 18.

For hazards that are uniform across the jurisdiction (i.e. severe summer weather and severe winter weather) the methodology presented below was used to determine annualized property loss.

- Exposure x Frequency x Magnitude

Where:

- Exposure = building stock, vulnerable population, or critical facilities at risk
- Frequency = annual number of events determined by calculating the number of hazard events / period of record
- Magnitude = percent of damage expected calculated by: (property damage/# incidents)/ building stock or critical facility exposure

For hazards without documented property damage, magnitude could not be calculated and therefore, only the exposure of the building stock or population was computed. Annualized loss estimates cannot be calculated without property damage using this risk assessment approach.

4.1.7 Data Limitations

Risk assessment and vulnerability analysis results are only a general representation of the potential loss that may be experienced from a hazard event and there are many inherent inaccuracies with the methodology used. Output is only as good as the data sources used and Cascade County may wish to consider alternate data for future MHMP updates.

The methodology used for estimating vulnerable population is tied to GIS analysis of the number of structures at risk for each hazard. There are inherent limitations with over- and under-reporting population because this method assumes all structures are occupied and that all structure types are occupied in accordance with 2010 U. S. Census Bureau estimates for residences. The census averages that 2.35 individuals reside in each structure, 22.5 percent of whom are under age 18 and 17.4 percent over age 65. *Section 4.1.2* presents further details on limitations associated with this method of estimating vulnerable population.

The remainder of this section presents hazard profiles organized by County priority followed by a risk assessment summary. Loss estimates, where applicable, are summarized at the end of this section.

4.2 Hazardous Material Incidents

CPRI SCORE = 3.7

Description and History

A hazardous material release is the contamination of the environment (i.e. air, water, soil) by any material that because of its quantity, concentration, or physical or chemical characteristics threatens human health, the environment, or property. Hazardous materials, including petroleum products and industrial chemicals, are commonly stored and used in Cascade County and are regularly transported via the region's roadways, railroads, and pipelines. A release of hazardous materials from both fixed and transportation incidents pose possible threats involving emergency response. Hazards range from small spills on roadways to major transportation releases on railways or pipeline ruptures contaminating land and water.

Hazardous material incidents in Cascade County have mostly been minor. Records of hazardous material events from 1990 to 2016, available from the National Response Center database, are summarized in **Table 4.2-1**.

Table 4.2-1. Cascade County Hazardous Material Incidents; 1990 – 2016

Incident Date	Type of Incident	Incident Cause	Location	Nearest City	Suspected Responsible Party	Material Spilled
10/31/1990	Fixed	Unknown	Vaughn Radio Site	Vaughn	US West	Oil: Diesel
2/27/1991	Mobile	EF	Building 245 1st Ave.	Malmstrom AFB	U.S. Air Force	Jet Fuel: Jp-4
5/1/1991	Mobile	EF	Malmstrom AFB	Malmstrom AFB	U.S. Air Force	Hydraulic Oil
7/8/1991	Fixed	OE	Bldg 145	Malmstrom AFB	U.S. Air Force	Halon
8/16/1991	Mobile	TA	Commercial Gate	Malmstrom AFB	Consol. Freightways	Oil: Diesel
8/27/1991	Fixed	Unknown	Ryan Dam	Great Falls	Montana Power Co	Oil: Diesel
12/5/1991	Aircraft	EF	352 Degrees	Malmstrom AFB	U.S. Air Force	Jet Fuel: Jp-4
1/22/1993	Pipeline	Unknown	1209 6th Ave South	Great Falls	Great Falls Gas Co	Natural Gas
7/28/1993	Fixed	EF	43rd St & 10th Ave S.	Great Falls	Montana Power Co	PCBs
2/20/1994	Pipeline	OE	1700 11th Ave South	Great Falls	Great Falls Gas Co.	Natural Gas
4/10/1994	Fixed	Dumping	Gibson Flats Road	Great Falls	NW Equipment	Diesel; Waste Oil/ Lubricants
5/5/1994	Fixed	Unknown	1900 10th St	Great Falls	MT Refining Co	Hydrochloric Acid
6/2/1994	Fixed	EF	166 Ryan Loop	Great Falls	MT Power Co	Hydraulic Oil
7/21/1994	Fixed	Unknown	9th No./ Smelter Ave.	Great Falls	Montana Refinery	Unknown Material
7/26/1994	Fixed	OE	36 Rainbow Dam Rd	Great Falls	MT Power Co	Hydraulic Oil
7/29/1994	Fixed	Unknown	Smelter Ave	Great Falls	Montana Refining	Unknown Material
8/18/1994	Fixed	EF	Ryan Power House	Great Falls	MT Power Co	Oil, Misc: Lubricating
2/8/1995	Fixed	EF	Malmstrom AFB Bldg	Malmstrom AFB	U.S. Air Force	--
2/28/1995	Fixed	Unknown	312 3rd Ave South	Great Falls	Meadow Gold Dairy	--
4/4/1995	US	Unknown	10th St Bridge	Great Falls		Unknown Oil
5/10/1995	Fixed	Other	2929 10th Ave South	Great Falls	Pro Lube	Dextron; Motor Oil
5/31/1995	US	EF	Malmstrom AFB	Malmstrom AFB	U.S. Air Force	Jet Fuel: JP-4
7/17/1995	Fixed	Dumping	1707 5.5 Ave South	Great Falls	--	Sulfadiazine
9/8/1995	US	Other	1900 10th St NE	--	--	Ethylene Glycol
12/14/1995	Mobile	OE	Malmstrom AFB	Malmstrom AFB	U.S. Air Force	Oil: Diesel
4/5/1996	US	Dumping	Bay Drive on Missouri	Great Falls	Cenex	Unknown Material
5/17/1996	Fixed	OE	1900 10th St	Great Falls	Montana Refining	Sulfuric Acid
6/12/1996	Mobile	Unknown	GF Intl Airport	Great Falls	Northwest Airlines	Jet Fuel: JP-4
7/8/1996	Fixed	Other	166 Ryan Loop	Great Falls	MT Power Co	Hydraulic oil; gasoline

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Table 4.2-1. Cascade County Hazardous Material Incidents; 1990 – 2016

Incident Date	Type of Incident	Incident Cause	Location	Nearest City	Suspected Responsible Party	Material Spilled
11/29/1996	Fixed	EF	336 Rainbow Dam Rd	Great Falls	MT Power Co	Governor Oil
1/29/1997	Railroad	Other	MM 154.3	Cascade	BNSF Railroad	Oil, Fuel: No. 2-D
8/22/1997	Fixed	EF	6200 3rd Ave South	Great Falls	FAA	Oil: Diesel
9/17/1997	Fixed	Unknown	336 Rainbow Dam Rd	Great Falls	MT Power Co	Oil, Misc: Lubricating
4/9/1998	Fixed	Unknown	152 Doc Russell Rd	Fort Shaw	Independent Farmer	Ammonia, Anhydrous
6/6/1998	US	Dumping	I-15, MM 279	Great Falls	--	Mystery Barrel
8/31/1998	Mobile	OE	I-15 Near MM:282	Great Falls	Watkins Sheppard	Oil: Diesel
4/8/1999	Fixed	Unknown	312 3rd Ave South	Great Falls	Meadow Gold Dairy	Ammonia, Anhydrous
11/19/1999	Fixed	Unknown	1900 10th St NE	Great Falls	Montana Refining	Gasoline; Diesel Oil
2/6/2000	Fixed	OE	I-15, Exit 277	Great Falls	Pop In Conoco	Oil: Diesel
3/10/2000	Fixed	OE	Cenex Bulk Plant	Power	Cenex Transportation	Oil: Diesel
8/2/2000	Pipeline	Unknown	Milepost 30.5	Great Falls	Conoco	Gasoline
8/24/2000	Fixed	Unknown	44 Bald Eagle Drive	Cascade	--	--
5/12/2001	Fixed	Unknown	East Of 10 St Bridge	Great Falls	--	Unknown Material
1/6/2002	Fixed	Other	1300 River Drive No.	Great Falls	MT Power Co	Non PCB Dielectric Oil
6/17/2002	ST	EF	North of Vaughn	Vaughn	Red Sky Co.	Oil: Diesel
6/18/2002	ST	EF	Sun River Backwaters	Vaughn	--	Oil: Diesel
5/5/2003	Mobile	EF	5001 49th St. SW	Great Falls	IRS	Pavement Oil
6/2/2003	ST	Other	1900 10th St. NE	Great Falls	Montana Refining	Slop Oil
8/31/2003	ST	Unknown	1700 52nd St N	Great Falls	Mtn View Fertilizer	Propane
9/25/2003	Fixed	EF	1900 10th St. NE	Great Falls	Montana Refining	NO; NO ₂
10/28/2003	ST	EF	1301 20th St. So.	Great Falls	MSU-GF	Chlorine
2/26/2004	Mobile	OE	341 CES/DEV	Malmstrom AFB	Talcott Const.	Transformer Oil
5/31/2004	Fixed	EF	1900 10th St. NE	Great Falls	Montana Refining	NO; NO ₂
4/6/2005	Aircraft	EF	Malmstrom AFB	Great Falls	US Air Force	Hydrazine
5/9/2005	Pipeline	EF	Section 11	Great Falls	Conoco Phillips	Hydro Test Water; Crude Oil
8/21/2005	Fixed	EF	1600 6th Street NE	Great Falls	Veolia Water NA	PCBs; Other Oil
9/16/2006	Mobile	EF	76th St/Goddard Dr	Malmstrom AFB	U.S. Air Force	Gasoline
10/21/2006	ST	OE	1900 10th St. NE	Great Falls	Montana Refining	Caustic
12/7/2006	Fixed	OE	Missouri River	Great Falls	PPL Montana	Hydraulic Oil
12/9/2006	Fixed	EF	Cochrane Hydro Plant	Great Falls	PPL Montana	Hydraulic Oil
5/10/2007	Aircraft	EF	2800 Airport Ave B	Great Falls	Air National Guard	Jet Fuel: JP-8
5/18/2007	Aircraft	Explosion	341st CES/DEV 39 78th St North	Malmstrom AFB	U.S. Air Force	Jet A Fuel; Hydraulic Oil; Diesel Oil
10/6/2007	Fixed	Dumping	8 25th Street South	Great Falls	Superior Autobody	Sanding/Sump Water
12/21/2007	Fixed	Unknown	Cochrane Dam	Great Falls	Spooner Const.	Vegetable Oil
12/26/2007	Mobile	TA	6 Miles N. GF, Hwy 87	Great Falls	Dixon Brothers Inc	Oil, Fuel: No. 2-D
1/19/2009	ST	EF	1900 10th St. NE	Great Falls	Montana Refining	Gas Oil / Asphalt
1/20/2009	Railroad	OE	1900 10th St. NE	Great Falls	Montana Refining	Asphalt
11/24/2009	Fixed	EF	Rainbow Dam Road	Great Falls	Walsh Construction	Gasoline
2/16/2010	ST	Other	Rainbow Dam	Great Falls	Walsh Construction	Diesel; Waste Water
6/28/2010	Fixed	EF	6720 Rainbow Dam Rd	Great Falls	Walsh Construction	Hydraulic Oil
7/12/2010	Fixed	EF	6720 Rainbow Dam Rd	Great Falls	Walsh Construction	Hydraulic Oil
7/19/2011	Railroad	Derailment	Gerber Road	Gerber	BNSF	1,000 Gallons Diesel
9/11/2012	Fixed	Other	19-60th Street North	Great Falls	Big Sky Transport	Motor Oil
10/7/2012	Railroad	Derailment	MP: 4	Great Falls	--	Asphalt (Residue)
7/30/2013	Fixed	EF	Morony Dam Road	Great Falls	PPL Montana	4 Gallons Gear Box Oil

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Table 4.2-1. Cascade County Hazardous Material Incidents; 1990 – 2016

Incident Date	Type of Incident	Incident Cause	Location	Nearest City	Suspected Responsible Party	Material Spilled
3/4/2014	Pipeline	EF	1900 10th Street NE	Great Falls	BNSF	--
3/16/2014	Fixed	OE	1900 10th St. NE	Great Falls	Calumet Refining Inc.	600 Gallons Sludge
3/21/2014	ST	EF	1900 10th Street NE	Great Falls	Calumet Refining Inc.	388 Gal Sodium Hydroxide
10/23/2014	Mobile	EF	12742 Hwy 201	Cascade	Thatcher Company	4134 Pounds Sulfuric Acid
2/9/2015	Fixed	Other	2535 9th Ave NW	Great Falls	Auto Parts Recycling	Transmission Fluid
6/15/2015	Fixed	EF	6700 Rainbow Dam Rd	Great Falls	NW Energy	Hydraulic Oil
6/30/2015	Fixed	Unknown	2000 Block 10th Ave So.	Great Falls	Unknown	Unknown Oil
6/7/2016	Mobile	EF	Old Havre Rd	Great Falls	Keller Transport	2500 Gallons Asphalt
6/15/2016	ST	OE	1940 Airport Ct	Great Falls	Dixon Brothers Inc.	1000 Gallons Jet-A
7/12/2016	Mobile	TA	Vaughn Road &	Great Falls	XPL Logistics	300 Gal Paraquat Dichloride

Source: National Response Center, 2016 (<http://www.nrc.uscg.mil/>).

Notes: EF = Equipment Failure; OE = Operator Error; ST = Storage Tank; TA = Transportation Accident; US = Unknown Sheen.

The Montana Department of Justice maintains a list of clandestine methamphetamine drug laboratory sites. Drug lab sites in Cascade County are listed in **Table 4.2-2**. Methamphetamine labs typically require a hazardous material response. According to the Great Falls Police Department, meth labs have changed in past 5 years. Instead of being large anhydrous operations, they are now one pot labs that aren't requiring significant haz-mat response.

Table 4.2-2. Cascade County Methamphetamine Laboratory Sites

Date	City	Address	Date	City	Address
11/21/1999	Great Falls	818-3rd Ave N	1/23/2003	Great Falls	1401-4th Ave NW
12/6/2000	Great Falls	2521-7th Ave N	3/4/2003	Great Falls	5405 Lower River Rd #111
2/15/2001	Stockett	11 Burrell Ave	3/31/2003	Black Eagle	1717 Smelter Ave NE
3/20/2001	Great Falls	2319-14th Ave S # 10	4/23/2003	Great Falls	612-11th St N
3/20/2001	Great Falls	2325-14th Ave S #48	8/20/2003	Great Falls	1600-20th Ave S
4/23/2001	Great Falls	25 Golden Valley Loop	7/22/2004	Great Falls	614-12th St N
5/8/2001	Cascade	170 Upper Sawmill Creek Rd	8/18/2004	Great Falls	520-2nd Ave S # 46
5/27/2001	Great Falls	418-5th Ave N Apt #9	11/10/2004	Great Falls	1008-7th Ave S
11/4/2001	Great Falls	908-5th Ave S	3/23/2007	Great Falls	1302-24th St S Apt #2
11/6/2001	Great Falls	10-19th St S	5/30/2007	Belt	166 Castner St
11/9/2001	Great Falls	4727-2nd Ave N #5	8/3/2007	Great Falls	2611 Upper River Rd #13
11/11/2001	Ulm	33 Ulm Vaughn Rd	7/23/2010	Fort Shaw	150 Hale St
12/21/2001	Great Falls	417-5th Ave N	4/15/2011	Black Eagle	1200-25th Ave NE
2/14/2002	Great Falls	2226 Central Ave W #26	1/8/2012	Great Falls	709-17th St. N
2/20/2002	Great Falls	911-3rd Ave NW	3/22/2012	Black Eagle	121-16th St NE
4/1/2002	Great Falls	4400-10th Ave S	10/7/2012	Great Falls	1014-4th Ave. S
7/17/2002	Great Falls	10-29th St NW	7/9/2014	Great Falls	1000-4th Ave. N
11/25/2002	Great Falls	46 Fields Rd	3/26/2016	Great Falls	2025-2nd Ave. SW
1/22/2003	Great Falls	38 White Ln			

Source: DEQ, 2016.

http://deqrpts.deq.mt.gov/reports/rwservlet?DEQ&report=MCP_ACTIVE_SITES.rep¶mform=no&p_col_1=COUNTY

Several hazardous material incidents that occurred in Cascade County since the 2011 PDM Plan was adopted are described below. Also in 2016, a spill of chemical defoliant got into the Great Falls storm sewer. Further details on this incident were not available.

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July 2011 – Two BNSF employees were injured on July 19, on Gerber Road, southeast of Great Falls, when a train rear-ended another train causing 13 of 110 BNSF Railway cars with three locomotives to derail. BNFS stated that 79 gallons of diesel fuel was released from the fuel tank (not 1,000 gallons as originally reported). Impacted soil was remediated and backfilled. (www.gordon-elias.com, *Two Railroad Workers Injured when BNSF Train Derails near Great Falls, MT*, July 28, 2011).

May 2015 – Emergency crews responded to a hazmat spill in Great Falls south of Giant Springs State Park. A fuel tank on a BNSF locomotive was ruptured in the accident. Workers at the scene caught leaking fuel in a barrel but a large pool of liquid was seen on the ground near the engine (www.krtv.com, *Emergency Crews Responding to Possible Hazmat Spill in Great Falls*, May 19, 2015).

July 2016 – A fire started in an old 1,600 square foot wooden building and flames spread to within 10 feet of a refinery train in Great Falls. The building was on BNSF property that had been leased to Calumet Refinery. The train cars were empty at the time can contain 5,000 to 6,000 gallons of oil each when full. Given the proximity of the rail cars to the building fire, several were damaged as a result of the incident. (www.krtv.com, *Structure Fire Spreads Close to Nearby Refinery Train in Great Falls*, July 2, 2016; Great Falls Tribune, *Great Falls Crews Battle Large Structure Fire*, July 2, 2016). MHMP public meeting participants indicated that if the wind direction had been different coupled with the increased output of tank cars from the refinery (approx. 8 to 70 cars per day), the incident could have been a very big deal.



August 2016 - An 18-wheeler caught fire and sent black smoke billowing into the air on U.S. Highway 87 (Old Havre Highway) north of Great Falls. Explosions rang out as onlookers watched the burning rig. Flames caused a small fire on both sides of the road. The cargo was diesel fuel. (Great Falls Tribune, *Tanker truck burns north of Great Falls*, August 20, 2016)

Research conducted for the Transportation Accident hazard (see *Plan Section 4.6*) indicated that between 1990 and 2016 there were 21 railroad accidents involving trains carrying hazardous materials. Of the 158 railcars carrying hazardous materials in these incidents, 42 were damaged; however, only one railcar actually had a hazardous material release. This incident occurred on April 23, 1993 in Vaughn and involved evacuating 30 people. Further details on the material spilled were not available. The July 19, 2011 railroad haz-mat incident in Gerber described above was not included in this data.

The U.S. Environmental Protection Agency (EPA) maintains the Toxic Release Inventory (TRI) of facilities that have released contaminants to the environment. TRI listings for Cascade County are presented in **Table 4.2-3**.

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Table 4.2-3 - Toxic Release Inventory – Total Aggregate Releases; 2011-2015

Facility/Year	Total On-Site Disposal or Other Releases	Total Off-Site Disposal or Other Releases	Total On- and Off-site Releases / Chemical	
Calumet Montana Refining LLC, 1900 10 th Street NE, Great Falls, MT				
2015	62,451 pounds	9,256 pounds	71,707 pounds	1,2,4-Trimethylbenzene; ammonia; antimony, arsenic, cadmium, chromium cobalt, copper, nickel, selenium, and zinc compounds; barium; benzene; glycol ethers; cumene; cyclohexane; ethylbenzene; ethylene; hydrogen fluoride; hydrogen sulfide; lead; mercury; N-hexane; naphthalene; phenol; propylene; toluene; xylene
2014	102,495 pounds	205,824 pounds	308,319 pounds	
2013	79,024pounds	2,301 pounds	81,325 pounds	
2012	83,964 pounds	32,269 pounds	116,233 pounds	
2011	76,861 pounds	6 pounds	76,867 pounds	
CHS Great Falls Seed, 5325 10th Ave. N., Great Falls, MT				
2015	795 pounds	750 pounds	1,545 pounds	Copper compounds, manganese compounds, zinc compounds
US DOD USAF Malmstrom AFB, 39 78th St. N., Cascade County, Montana				
2015	5,173 pounds	0	5,173 pounds	Lead
2014	4,233 pounds	0	4,233 pounds	
2013	4,985 pounds	0	4,985 pounds	
2012	7,370 pounds	0	7,370 pounds	
2011	5,173 pounds	0	5,173 pounds	

Source: U.S. EPA, 2016; (https://iaspub.epa.gov/triexplorer/tri_release.chemical)

Many facilities in Cascade County sell or use hazardous materials including the municipal water treatment facilities, industrial businesses, chemical dealers, and fuel distributors. Locations of facilities in Cascade County with Tier II reporting requirements are listed in **Table 4.2-4**.

Table 4.2-4. Cascade County Tier II Hazardous Material Reporters

Facility Name	Address	City
American Welding & Gas	2500-16th ST NE	Black Eagle
Black Eagle Bulk Fuel (Mtn View Co-op)	2200 Old Havre Hwy	Black Eagle
Black Eagle Retail Store (Mtn View Co-op)	1000 Smelter Ave	Black Eagle
Benefis Health System	1101-26th St S	Great Falls
BNSF Railway Company - Great Falls	620-5th Avenue SW	Great Falls
Bresnan Communications, LLC (Charter Comm.)	2100-21st Ave S	Great Falls
Calumet Montana Refining, LLC	1900 Tenth Street NE	Great Falls
Cascade Community Dial Office (Century Link)	160 Central Avenue	Cascade
Cereal Food Processors a Grain Craft Company	901-16th Street North	Great Falls
CHS Inc. - CHS Big Sky - Great Falls	700-6th Street SW	Great Falls
CHS, Inc. - Front Range Pipeline, LLC - Great Falls	1 Watson Ln	Great Falls
City of Great Falls Water Treatment Plant	1300 Upper River Road,	Great Falls
Coca-Cola High Country - Great Falls	933-38th Street N	Great Falls
Crop Production Services 6521	708 Highway 87 North	Great Falls
FedEx Express-GTFR	1400 Air Cargo Drive	Great Falls
Gannett Satellite Info Net - Great Falls Tribune	205 River Drive South	Great Falls
General Distributing - Great Falls	430-17th Ave NE	Great Falls
General Mills	2500-9th Ave N	Great Falls
Great Falls Armed Forces Reserve Center (Military Affairs)	401-63rd Street South	Great Falls
Great Falls Community Dial Office (Century Link)	401-1st Ave N	Great Falls
Great Falls Fertilizer Plant (Mtn View Co-op)	1700-52th Street N	Great Falls

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Table 4.2-4. Cascade County Tier II Hazardous Material Reporters

Facility Name	Address	City
Great Falls Substation (Western Area Power Admin.)	Rainbow Dam Road	Black Eagle
Great Falls Tribune	205 River Drive South	Great Falls
Helena Chemical Company	6201-18th Ave North	Great Falls
Horizon Air Great Falls	2800 Terminal Drive	Great Falls
Industrial Fumigant Company	4325 1/2 River Drive North	Great Falls
Kernaghans Service, Inc., Convenience Store & Warehouse	1504-9th Avenue North	Great Falls
Kernaghans Service, Inc., West Highwood Fertilizer Plant	332 Broadway East	Highwood
Malmstrom AFB	39-78th St. N.	Malmstrom AFB
Malmstrom AFB A	Malmstrom AFB	Belt
Malmstrom AFB I	Malmstrom AFB	Ulm
Malteurop North America Inc.	2800 Great Bear Ave	Great Falls
Meadow Gold Dairies (Dean Foods Comp.)	312 Third Avenue South	Great Falls
Montana Air National Guard - 120th Airlift Wing	2800 Airport Ave B	Great Falls
NorthWestern Energy - Black Eagle Dam Powerhouse	6700 Rainbow Dam Road	Great Falls
NorthWestern Energy - Morony Dam Powerhouse	20 mi. NE of GF on Missouri River	Great Falls
NorthWestern Energy - Cochrane Dam Powerhouse	8 Mi. E of GF on Missouri River	Great Falls
NorthWestern Energy - Rainbow #9 Dam Powerhouse	6700 Rainbow Dam Road	Great Falls
NorthWestern Energy - Montana Rainbow Dam Powerhouse	6700 Rainbow Dam Road	Great Falls
NorthWestern Energy - Montana Rainbow Shop Complex	6700 Rainbow Dam Road	Great Falls
NorthWestern Energy - Montana Ryan Dam Powerhouse	166 Ryan Loop	Great Falls
NorthWestern Energy Great Falls Operations Center	1501 River Drive North	Great Falls
Pacific Steel & Recycling Catalytic Converters - #54	1401-3rd Street NW	Great Falls
Pacific Steel & Recycling - #19	1624-12th Avenue North	Great Falls
Pacific Steel & Recycling- #1	1401-3rd Street N.W.	Great Falls
Phillips 66 Great Falls Product Terminal	1401-52nd Street North	Great Falls
Sam's Club #6379	401 NW Bypass	Great Falls
The Home Depot Store #3103	1500 Market Place Drive	Great Falls
Ulm Retail (Mtn View Co-op)	#2 Milligan Rd	Ulm
Vaughn CDO (Century Link)	3rd St And Central Ave	Vaughn
Verizon Wireless Airport Dr (18914)	1730 Airport Drive	Great Falls
Verizon Wireless Putter (23698320)	905-23rd Street North	Great Falls
Verizon Wireless Russell (155844)	600 Central Ave Suite 416	Great Falls
Wilbur-Ellis Company LLC - Great Falls, Mt	1966 Sixth Street NE	Great Falls
Winfield Solutions	801River Dr. S	Great Falls
Zayo Great Falls MT-83R	8-3rd St N/Fl-B/Rm-F	Great Falls

Source: Cascade County DES, 2017

According to the Montana State Hazard Mitigation Plan (2010), Great Falls had among the largest hazardous material spills from a fixed facility between 1997 and 2006. The National Response Center reported a spill on 12/5/2002 involved 15,000 barrels of diesel oil, a spill on 10/6/1999 involved 1,200 barrels of fuel oil, and a spill on 10/2/2002 involved 100 barrels of crude oil. Further details on these releases were not available.

Regional hazardous-material response trailers are positioned in Great Falls.

There have been no Presidential disaster declarations or State emergency declarations associated with the Hazardous Material Incident hazard in Cascade County and the likelihood of a significant event resulting in a disaster declamation is considered low.

Vulnerability and Area of Impact

Great Falls is home to several large facilities which generate, store, or transport hazardous materials and petroleum projects including: Calumet Montana Refining which refines approximately 9,800 barrels per day of crude oil to produce gasoline, middle distillates and asphalt; a number of large facilities that distribute agricultural products, specialty chemicals, and ingredients; the Phillips 66 bulk petroleum storage facility; and, Malmstrom Air Force Base.

Transportation of hazardous materials through Cascade County on highways, pipelines, and by the railroads could result in an accident or derailment that would have the potential to impact Cascade County residents. Although there is no history of significant incidents, the potential for a hazardous material accident in Cascade County is present.

The volume and type of hazardous materials that flow into, are stored, and flow through communities will determine exposure to a potential release of hazardous materials. An accidental or intentional release of materials could produce a health hazard to those in the immediate area, downwind, and/or downstream. Some hazardous materials occur in the gaseous phase and are denser than air; therefore, having the potential to collect in low places.

The Emergency Planning and Community Right-to-Know Act (EPCRA) was enacted in 1986 to inform communities and citizens of chemical hazards in their areas. Sections 311 and 312 of EPCRA require businesses to report the locations and quantities of chemicals stored on-site to state and local governments in order to help communities prepare to respond to chemical spills and similar emergencies. EPCRA Section 313 requires the EPA and the states to annually collect data on releases and transfers of certain toxic chemicals from industrial facilities, and make the data available to the public in the Toxics Release Inventory. In 1990 Congress passed the Pollution Prevention Act which required that additional data on waste management and source reduction activities be reported under TRI. The goal of TRI is to empower citizens, through information, to hold companies and local governments accountable in terms of how toxic chemicals are managed. There are three active TRI facilities in Cascade County, as shown in **Table 4.2-3**.

The U.S. Department of Transportation issued an emergency order on February 25, 2014 to address the safety of transporting crude oil by rail. According to the order, all shippers moving crude from the Bakken shale formation in the Williston Basin (Bakken crude oil) must test their product to ensure it is properly classified before transit. The order came in response to the series of crude oil train derailments, some of which led to explosions and injuries. Shippers must test their oil for a range of characteristics, and are required to use more robust tank cars if the oil falls into certain categories. There is evidence that crude oil from the Bakken is more flammable than typical oil. The order also forbids the use of rail cars that are usually only used for less hazardous materials (www.transportation.gov).

To model the spatial distribution of hazardous material incident risk a GIS data layer of transportation arteries was used, which included highways, major roadways, and railroads. TRI facilities were added to this layer and it was then buffered by 0.25 miles. Building exposure was calculated by intersecting the hazardous material buffer with the MDOR parcel and critical facility GIS layers. Population exposure was calculated by intersecting the hazardous material buffer with census block data. Limited property damage estimates are available from past hazardous material incidents so the estimates presented in **Table 4.2-5** represent exposure risk (vulnerability) in the

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hazard area. **Figures 5 and 5A** presents the hazardous material buffer in Cascade County and City of Great Falls, respectively, and show the vulnerability of critical facilities to hazardous material incidents.

Table 4.2-5. Cascade County Vulnerability Analysis; Hazardous Material Incidents

Category	Cascade Co. (balance)	Great Falls, City	Belt, Town	Cascade, Town	Neihart, Town
Residential Property Exposure \$	\$402,495,883	\$4,691,105,943	\$7,205,917	\$25,278,675	\$5,234,388
# Residences At Risk	2,935	10,736	80	261	61
Commercial, Industrial & Agricultural Property Exposure \$	\$133,811,952	\$1,395,432,061	\$1,564,756	\$6,731,463	\$1,871,664
# Commercial, Industrial & Agricultural Properties At Risk	419	1,646	8	61	4
Critical Facilities Exposure Risk \$	\$848,395,808	\$663,373,830	\$5,708,132	\$7,198,346	\$887,371
# Critical Facilities At Risk	37	69	11	11	2
Bridge Exposure \$	\$140,446,775	\$16,933,895	\$371,995	\$0	\$258,394
# Bridges At Risk	125	19	1	0	2
Persons At Risk	6,898	25,230	188	613	143
Persons Under 18 At Risk	1,579	5,778	43	140	33
Persons Over 65 At Risk	1,029	3,759	28	91	21

The GIS analysis indicates that there are 155,404 acres in Cascade County in the hazardous material buffer (9 percent) including 14,073 residences, 2,138 commercial, industrial and agricultural buildings, and 130 critical facilities. The *Hazardous Material Incident* Section in **Appendix C-2** lists the critical facilities and bridges within the hazardous material hazard buffer.

Probability and Magnitude

According to the U.S. Department of Transportation, Office of Hazardous Materials Safety, Cascade County has had numerous hazardous material release with reported damages in the past 25 years, as shown in **Table 4.2-6**.

Table 4.2-6. Cascade County Hazardous Material Incidents with Damages

Date	Location	Carrier	Quantity Released	Commodity Released	Damages	Mode of Transport
1/14/1992	Great Falls	Dixon Bros. Inc.	50 gal	Gasoline	\$49	Highway
4/12/1992	Great Falls	Dixon Bros. Inc.	1,000 gal	Combustible Liquid	\$18,800	Highway
5/20/1992	Great Falls	Dixon Bros. Inc.	20 gal	Gasoline	\$20	Highway
7/22/1992	Great Falls	Dixon Bros. Inc.	30 gal	Gasoline	\$30	Highway
10/11/1992	Great Falls	Dixon Bros. Inc.	55 gal	Gasoline	\$52	Highway
11/5/1992	Great Falls	Federal Express	2.64 gal	Nitric Acid O	\$5,000	Air
6/23/1993	Great Falls	Dixon Bros. Inc.	73 gal	Gasoline	\$81	Highway
12/23/1993	Great Falls	Dixon Bros. Inc.	5,900 gal	Aviation Fuel	\$40,750	Highway
12/20/1994	Great Falls	Dixon Bros. Inc.	150 gal	Diesel Fuel	\$919	Highway
10/5/1996	Great Falls	Burlington Northern	10 gal	Sodium Hydrosulfide	\$20	Rail
11/26/1996	Great Falls	Basin Western Inc.	100 gal	Hydrochloric Acid	\$34	Highway
7/23/1997	Great Falls	Dixon Bros. Inc.	20 gal	Gasoline	\$95	Highway
7/2/1999	Great Falls	Dixon Bros. Inc.	50 gal	Gasoline	\$50	Highway
11/16/1999	Great Falls	Dixon Bros. Inc.	32 gal	Gasoline	\$205	Highway
4/18/2000	Black Eagle	Dixon Bros. Inc.	61 gal	Diesel Fuel	\$50	Highway
11/11/2000	Great Falls	BNSF	5 gal	Methanol	\$3,605	Rail

Section 4: Risk Assessment and Vulnerability Analysis

Table 4.2-6. Cascade County Hazardous Material Incidents with Damages

Date	Location	Carrier	Quantity Released	Commodity Released	Damages	Mode of Transport
3/21/2001	Great Falls	Consolidated Freightways	15 gal	Methanol	\$2,000	Highway
2/22/2002	Great Falls	YRC Inc.	3 gal	Phosphoric Acid	\$430	Highway
6/27/2003	Great Falls	YRC Inc.	1 gal	Hydrochloric Acid	\$385	Highway
10/11/2004	Great Falls	YRC Inc.	0.12 gal	Flammable Liquids	\$515	Highway
12/26/2007	Great Falls	Dixon Bros. Inc.	2,100 gal	Diesel Fuel	\$44,236	Highway
8/18/2010	Great Falls	BNSF Railway Company	2 gal	Corrosive Liquids	\$1,200	Rail
2/2/2011	Great Falls	BNSF Railway Company	2 gal	Sodium Hydroxide	\$1,205	Rail
8/23/2011	Great Falls	BNSF Railway Company	2 gal	Sodium Hydroxide	\$1,205	Rail
9/8/2012	Great Falls	BNSF Railway Company	3 gal	Sodium Hydroxide	\$1,910	Rail
5/10/2013	Great Falls	Allegiant Air	0.06 gal	Battery Fluid Acid	\$1,055	Air
5/7/2014	Great Falls	BNSF Railway Company	0.12 gal	Corrosive Liquid	\$10,900	Rail
11/11/2014	Great Falls	BNSF Railway Company	1 gal	Alcohols N.O.S.	\$2,003	Rail
11/12/2014	Great Falls	BNSF Railway Company	2 gal	Alcohols N.O.S.	\$2,026	Rail
11/20/2014	Great Falls	BNSF Railway Company	2 gal	Diesel Fuel	\$2,406	Rail
4/13/2016	Great Falls	BNSF Railway Company	1 gal	Sodium Hydroxide	\$1,000	Rail
4/28/2016	Great Falls	XPO Logistics	3 gal	Resin Solution	\$2,700	Highway
7/12/2016	Great Falls	XPO Logistics	300 gal	Corrosive Liquids	\$13,500	Highway
TOTAL					\$158,436	

Source: U.S. Dept. Transportation, 2016; <https://hazmatonline.phmsa.dot.gov/IncidentReportsSearch/IncrSearch.aspx>

Notes: gal = gallons.

The history of hazardous material events in Cascade County indicates 85 incidents have occurred over the past 27 years. Therefore, the probability of future events is rated as “highly likely”. The MHMP Planning Team also rated this hazard as “highly likely”. The magnitude of any hazardous material event would depend on the amount and material spilled.

Future Development

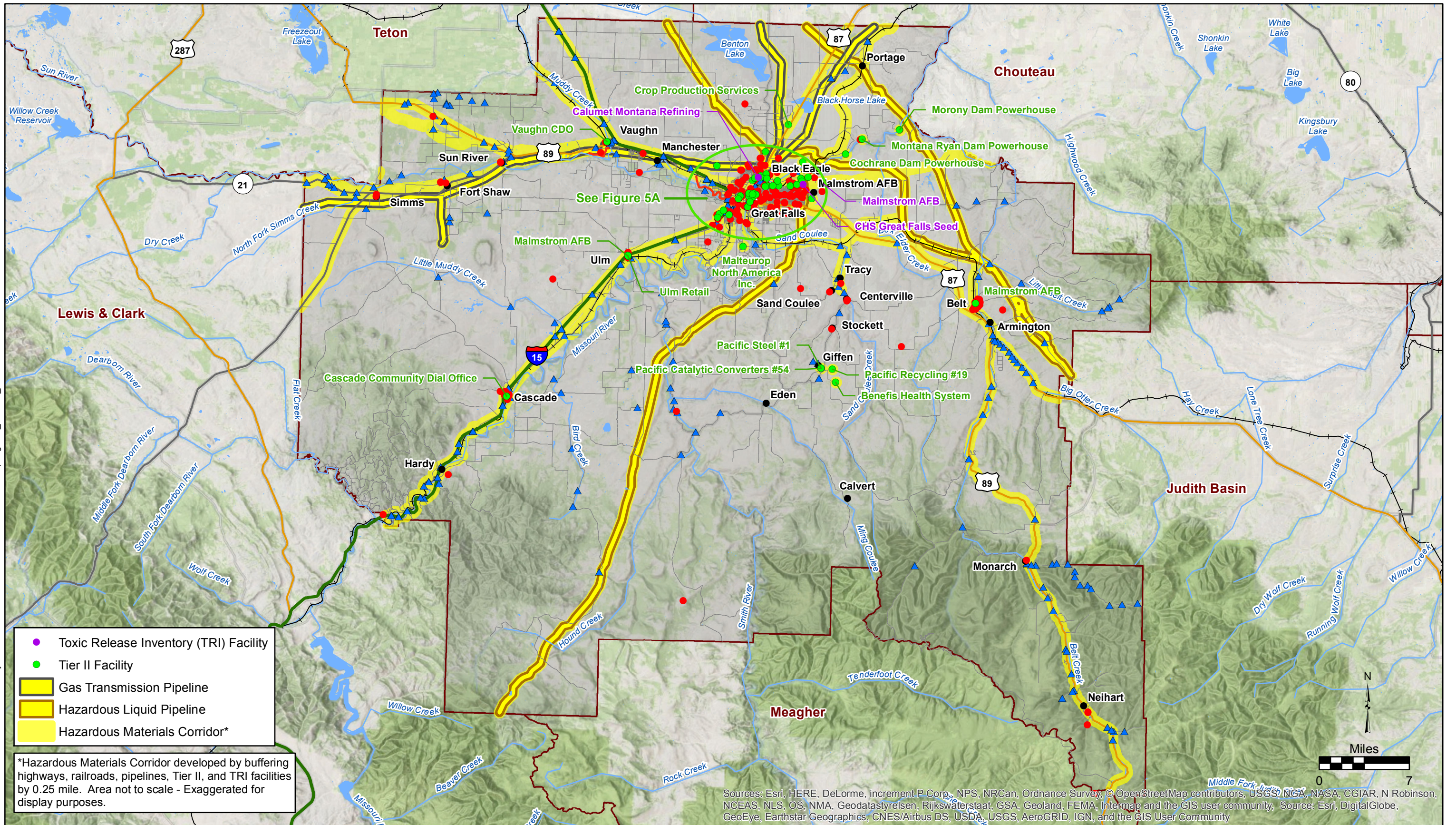
Cascade County has no land use regulations that restrict building around industrial facilities or along transportation routes or in the vicinity of facilities that store large quantities of hazardous materials or petroleum products.

The U.S. Department of Transportation regulates the ways in which non-radioactive hazardous materials can be transported. Currently, there are no designated HAZMAT routes in central Montana. So, these materials can be transported through Great Falls and Cascade County with few restrictions. (Great Falls Growth Policy, 2013).

There are no land use regulations that restrict building around industrial facilities, along transportation routes, or in the vicinity of facilities which store large quantities of hazardous materials/petroleum products.

Climate Change

Hazardous material incidents are not expected to increase as a result of climate change. No increase in exposure or vulnerability to the population, property, or critical facilities are expected to occur.



Date: 4/21/2017

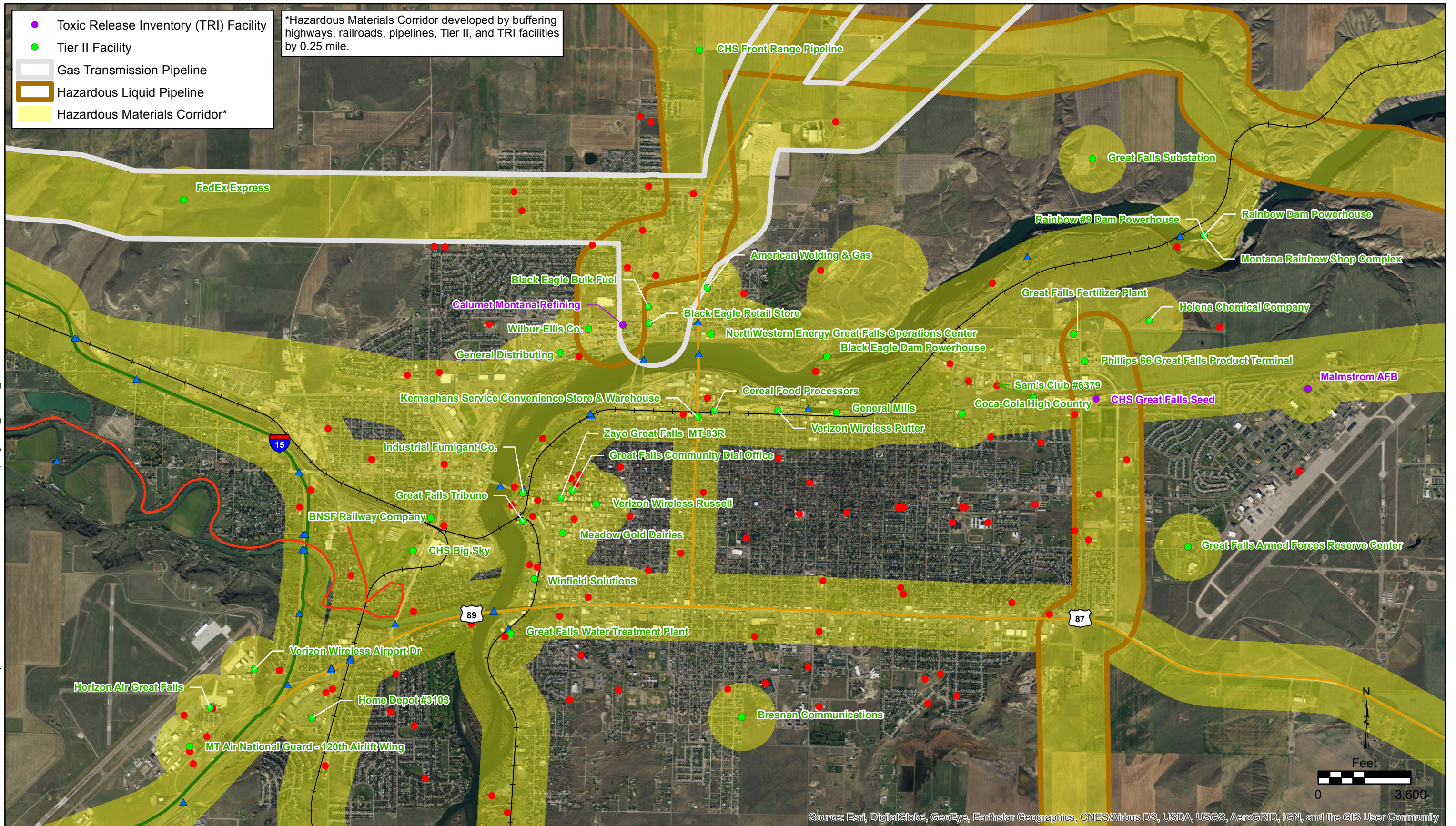


Legend

- | | | | | |
|---------------------------|-------------------|----------------|---------------|-------------------|
| ● Critical Facility | ○ County Seat | — Interstate | — Other Route | — Lake/Reservoir |
| ● Place | ▲ Bridge | — U.S. Highway | — Railroad | — River/Stream |
| — Levee Critical Facility | — Montana Highway | | | — County Boundary |

Figure 5
Hazardous Material & Transportation Buffer
Cascade County, Montana
Multi-Hazard Mitigation Plan

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Date: 3/17/2017



Legend

- Critical Facility
- ▲ Bridge
- Interstate
- U.S. Highway
- Montana Highway
- Railroad
- Levee Critical Facility

Figure 5A
Hazardous Material & Transportation Buffer
Great Falls, Montana
Multi-Hazard Mitigation Plan

4.3 Wildfire

CPRI SCORE = 3.7

Description and History

A wildfire is an unplanned fire, a term which includes grass fires, forest fires and scrub fires, both man-caused and natural in origin. Severe wildfire conditions have historically represented a threat of potential destruction within the region. Negative impacts of wildfire include loss of life, property and resource damage or destruction, severe emotional crisis, widespread economic impact, disrupted and fiscally impacted government services, and environmental degradation.

Wildfire risk is the potential for a wildfire to adversely affect things that residents value - lives, homes, or ecological functions and attributes. Wildfire risk in a particular area is a combination of the chance that a wildfire will start in or reach that area and the potential loss of human values if it does. Human activities, weather patterns, wildfire fuels, agricultural practices, values potentially threatened by fire, and the availability (or lack) of resources to suppress a fire all contribute to wildfire risk. The Conservation Reserve Program (CRP) land and with the change of agricultural practices, i.e. no-till farming, have created significant wildland fire risk in parts of Cascade County.

Fire season is the result of low rainfall, high temperatures, low humidity, and thunderstorms, high winds and lightning. Varied topography, semi-arid climate, and numerous human-related sources of ignition make this possible. Over 60 percent of fire starts in Cascade County are caused by lightning. Man-made fire starts account for the remainder including; debris burning, fireworks, campfire neglect, careless smokers, downed powerlines, or heated farm equipment in dry grass or crops. Only a fraction of fire starts are arson. BNSF representatives at the MHMP public meeting indicated that the railroad scrubs equipment to minimize sparks. There were only 1 or 2 fires started by the railroad in Cascade County in 2016.

Major wildfires can occur at any time of year. **Table 4.3-1** presents warning and advisory criteria for wildfire and a description of prohibitions that land management agencies can put into effect to reduce fire risk and prevent wildfires during periods of high to extreme danger.

Table 4.3-1. Warning, Advisories and Restrictions for Wildfire

Warning/Advisory/ Restriction	Description
Fire Weather Watch	A fire weather watch is issued when Red Flag conditions (see Red Flag Warning) are expected in the next 24 to 72 hours.
Red Flag Warning	A red flag warning is issued when Red Flag criteria are expected within the next 12 to 24 hours. A Red Flag event is defined as weather conditions that could sustain extensive wildfire activity and meet one or more of the following criteria in conjunction with "Very High" or "Extreme" fire danger: <ul style="list-style-type: none"> • Sustained surface winds, or frequent gusts, of 25 mph or higher; • Unusually hot, dry conditions (relative humidities less than 20%); • Dry thunderstorm activity forecast during an extremely dry period; • Anytime the forecaster foresees a change in weather that would result in a significant increase in fire danger. For example, very strong winds associated with a cold front even though the fire danger is below the "Very High" threshold.
Fire Warning	A fire warning may be issued by local officials when a spreading wildfire or structure fire threatens a populated area. Information in the warning may include a call to evacuate areas in the fire's path as recommended by officials according to state law or local ordinance.
Dense Smoke Advisory	Dense smoke advisories are issued when the widespread visibilities are expected at a ¼ mile or less for a few hours or more due to smoke.

Section 4: Risk Assessment and Vulnerability Analysis

Table 4.3-1. Warning, Advisories and Restrictions for Wildfire

Warning/Advisory/Restriction	Description
Stage 1 Fire Restriction	No building, maintaining, attending, or using a fire, campfire, or stove fire without a permit except in Forest Service developed camp or picnic grounds. No smoking unless in an enclosed vehicle or building, a developed recreation site, or while stopped in an area at least three feet in diameter that is barren or cleared of all flammable material. No operation of welding, acetylene, or other torch with an open flame. No operation or using any internal or external combustion engine without a spark arresting device properly installed, maintained and in effective working order.
Stage 2 Fire Restriction	No building, maintaining, attending or using open fire campfires or stove fires. No smoking unless in an enclosed vehicle or building, a developed recreation site, or within a three foot diameter cleared to mineral soil. No operation of welding, acetylene, or other torch with an open flame. No operation or using any internal or external combustion engine without a spark arresting device properly installed, maintained and in effective working order.

Source: National Weather Service (NWS, 2016); National Interagency Fire Center, 2016 (gacc.nifc.gov/.../r2ftc/documents/Fire_Restriction_Chart.pdf)

Cascade County has large areas of private agricultural lands (81.7 percent). The federal government manages approximately 12.4 percent of the total land in the County including portions of the Lewis and Clark National Forest (178,412 acres) and BLM land (24,627 acres). The State of Montana manages a 5.2 percent of the acreage. This scattering of government and private ownership can present unique firefighting challenges.

Cascade County has witnessed a number of large wildfires that have destroyed property and affected wildlife habitat, scenic resources, and air quality. Between 1992 and 2012, a total of 70 fires burned 6,337 acres in the county. The majority of these fires occurred in the months of July and August and were caused by lightning and farm equipment. The wildfires were generally less than one acre in size and were extinguished within one day. **Table 4.3-2** presents wildfire listings from the Montana DNRC over 100 acres with statistics on structures lost and suppression cost where available.

Table 4.3-2. Wildfire Listings >100 Acres in Cascade County

Date	Name	Acres	Cause	Structures Lost	Suppression Cost
8/17/1985	Sun River	200	-	-	-
10/16/1991	Dearborn	170	-	-	-
8/19/1992	Sugarloaf #2	260	Miscellaneous	-	\$164,192
3/22/1994	Gondiero Ranch	400	Debris burning	-	\$478
9/9/1994	Bootlegger #1	100	Smoking	-	\$900
8/18/1996	Sheep Creek #1	700	Lightning	-	\$18,492
10/10/1996	Cascade Butte	1,100	Equipment	-	\$2,266
7/15/2003	Box Canyon	160	Campfire	1 OB	\$851,172
7/23/2009	Chokecherry	145	Miscellaneous	0	\$63,394
7/29/2011	Vinyard Road	700	Equipment	-	-
9/6/2011	Cora Creek Road	825	Equipment	-	-
3/3/2012	Moodie	8,000	-	-	-
7/22/2012	Mission Road	3,176	Lightning	0	\$1,335,711
7/30/2012	Ogden Ranch	~7,000	-	-	-
8/14/2015	Adel	262	Lightning	0	\$4,537
7/19/2016	Vinyard	700	Equipment	0	-
7/26/2016	Vinyard II	7,800	Equipment	-	-
TOTAL		31,698		1 OB	\$2,441,142

Source: DNRC, 2016; Jesse Oldham, 2017; Notes: "-" indicates no data available; OB = Outbuilding

Section 4: Risk Assessment and Vulnerability Analysis

Cascade County was part of state emergency and/or disaster declarations due to wildfire in 1991, 1992, 1994, 1996, 1998, 2000, 2001, 2006, and 2007. These events were part of larger state-wide declarations. A federal disaster declaration was issued in 2000. Description of two significant wildfires in Cascade County since the 2011 PDM Plan was adopted, are presented below.

July 24, 2012 – Mission Road Fire – Lightning sparked a fast moving fire which ignited in grass on private land east of Highway 287, north of Wolf Creek in the extreme southwest corner of Cascade County. The fire saw explosive growth in the first 48 hours, but winds died down and humidities went up allowing firefighters to directly attack the western flank of the fire. Seven homes that were in danger cleared brush from their property, watered their lawns and directed fire engines on how best to access the blaze. The fire burned 3,176 acres or five square miles. (Great Falls Tribune, *Mission Road Fire Now 50 Percent Contained*, July 25, 2012).

July 26-27, 2016, Vinyard II Fire - A grass fire on farmland north of great falls blew up in high winds, racing across thousands of acres and marching toward the Great Falls city limits, threatening several neighborhoods and forcing evacuations while cove ring the city with a fog of smoke. The fire, sparked by farm equipment, burned 15,000 acres and threatened several homes and livestock. The fire was deemed contained but the wind switched and a thunderstorm rolled through the area causing powerful downdraft winds that picked up embers and blew them toward the city. The fire threatened a building housing two radio transmitters for two FM radio stations, including a 800-foot tall radio tower next to the building. (Great Falls Tribune, *Fire Menaces Great Falls, Threatens Homes*, July 26, 2016).



Fighting wildland fires on private and state land in Cascade County is primarily the responsibility of the local volunteer fire districts. The U.S. Forest Service and the BLM are responsible for providing wildland fire protection on federal lands within Cascade County. The Cascade County Rural Fire Council has been instrumental in maximizing the efficiency of local fire districts in responding to wildfires.

Cascade County completed a Community Wildfire Protection Plan (CWPP) in 2008 (Firelogistics, 2008). This document is presented in **Appendix E**. Mitigation projects identified in the CWPP are incorporated herein by reference.

Vulnerability and Area of Impact

Problems with wildfire also occur when combined with the human environment. People and structures near wildfires are threatened unless adequately protected through evacuation or mitigation. Should fires occur, structures within the wildland-urban interface (WUI) are very vulnerable. The WUI is the zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. A WUI exists anywhere that structures are located close to natural vegetation and where a fire can spread from vegetation to structures, or vice versa. The most extreme situation with respect to fuel conditions and values at risk occurs in

Section 4: Risk Assessment and Vulnerability Analysis

rural subdivisions where numerous high-value individual homes and subdivisions are located in the WUI in close proximity or within the wildland boundary. A significant loss of life could occur to residents, firefighters, and others who are in the wildfire area and do not evacuate. The CWPP identifies the following WUI areas in Cascade County: the Dearborn Area, including Cooper Ranch and Stickney Creek; Hardy - Missouri River Corridor; Logging Creek Area; the southwest side of the Highwood Mountains adjacent to the National Forest; and, the Missouri, Sun and Smith River corridors. The current and potential development of portions of Cascade County into residential lots of varying sizes will contribute to the WUI fire problem for the fire protection agencies in the county (Firelogistics, 2008).

According to the Cascade County CWPP, five primary issues make the county particularly vulnerable to wildfire. These include: 1) the semi-arid landscape and poor moisture regime that due to the lack of moisture during any of the four seasons can place the county into a fire season throughout a large share of the year; 2) the wind generated from the Rocky Mountain Front Range can turn an ignition into a large wildland fire in a very short period of time; 3) the size and scale of the county, scattered numbers of outlying fire stations, significant reduction in number of people willing to volunteer as fire fighters in the county, and ageing population in Neihart; 4) lands in CRP which can be easily ignited and could result in extreme fire behavior, especially under windy conditions, and provide for challenging wildland fire suppression efforts; and, 5) a very high risk subdivision with the high potential for suffering loss of life, property and resources from a wildland fire. Cascade County communities listed in the Federal Register as “Communities at Risk” from wildland fire include Monarch and Neihart (Firelogistics, 2008).

Often regional electric infrastructure passes through wildland and non-irrigated agricultural areas. In particular, the electric substations, transmission lines, fuel tanks, and radio transmission towers are not often equipped to withstand the heat from a wildfire. A wildfire could disrupt electricity or communications should this infrastructure be damaged.

Smoke from wildfires outside Cascade County have impacted local air quality. Most smoke comes from the southwest, west, and north. However, the consistent wind in area minimizes the public health hazard that wildfire smoke poses elsewhere in the state.

Probability and Magnitude

Cascade County’s history with wildfire, dry and windy weather conditions, large acres of the county in CRP, and private access roads to rural subdivisions has prompted the MHMP Planning Team to identify wildfires as a significant hazard. Although the primary concern is to structures and the interface residents, most of the costs associated with fire, come from firefighting efforts. Wildfires can also have a significant impact on the regional economy with the loss of agricultural output, timber, natural resources, recreational opportunities, and tourism.

The trend in climatic conditions in recent years has had major implications for increased wildland fire severity. Areas within the Highwood and Little Belt Mountains contain continuous stands of multi-storied Douglas fir, Lodgepole pine and sub-alpine fir that create a fire prone ecosystem subject to repeated wildland fires (Firelogistics, 2008). A stakeholder comment indicated CRP fires have gotten large in recent years.

Section 4: Risk Assessment and Vulnerability Analysis

Property damage is difficult to obtain for wildfires since it is typically agricultural resources and forest that sustain the damage. As such, the magnitude of wildfire can be correlated with the acres burned and cost to suppress the fire by local, state, and federal agencies. **Table 4.3-2** indicates that suppression costs have amounted to \$2.4 million over the past 30 years.

Wildfire does not present a uniform risk across Cascade County. To perform the MHMP analysis for the wildfire, the WUI layer from the County's CWPP (Firelogistics, 2008) was used combined with a WUI model that defines zones up to four miles from interface communities where population density ≥ 250 people per square mile. Each four mile zone was divided into one mile buffers, each assigned a WUI risk class. The resulting WUI map used for the analysis was adjusted by project stakeholders who felt the Great Falls urban area should be excluded from the WUI hazard area. **Figure 6** presents a wildfire risk map showing the wildfire hazard area used for the MHMP analysis.

To complete the vulnerability analysis for this project, GIS was used to intersect the wildfire hazard area with both the critical facility and MDOR cadastral parcel datasets. Estimates of vulnerable population were calculated using U.S. Census data on number of individuals per residence. Exposure values are presented in **Table 4.3-3**. Building exposure reflects only the monetary structure value and does not account for improvements or personal effects that may be lost to wildfire.

Table 4.3-3. Cascade County Vulnerability Analysis; Wildfire

Category	Cascade Co. (balance)	Great Falls, City	Belt, Town	Cascade, Town	Neihart, Town
Residential Property Exposure \$	\$1,299,940,864	\$106,532,382	\$8,663,740	\$25,278,675	\$5,425,218
# Residences At Risk	6,961	363	98	261	63
Commercial, Industrial & Agricultural Property Exposure \$	\$166,381,741	\$15,769,986	\$4,223,279	\$6,731,463	\$1,871,664
# Commercial, Industrial & Agricultural Properties At Risk	581	14	14	61	4
Critical Facilities Exposure Risk \$	\$717,190,781	\$66,481,888	\$7,024,595	\$7,198,346	\$887,371
# Critical Facilities At Risk	53	12	16	11	2
Bridge Exposure \$	\$139,411,573	\$0	\$371,995	\$0	\$258,394
# Bridges At Risk	177	0	1	0	2
Persons At Risk	16,359	853	230	613	148
Persons Under 18 At Risk	3,733	195	53	140	34
Persons Over 65 At Risk	2,429	127	34	91	22

GIS analysis of the wildfire risk to Cascade County indicates that 885,895 acres (51 percent) are within the WUI. According to the vulnerability analysis, 7,746 residences, 674 commercial, industrial and agricultural buildings, and 94 critical facilities are located in the wildfire hazard area. The Wildfire Section in **Appendix C-2** lists the critical facilities and bridges within wildfire hazard area.

Wildfires generally occur more than once per year in Cascade County and therefore, the probability of future events are rated as "highly likely".

Future Development

Wildfire disasters can be mitigated through comprehensive land use planning that includes housing development design, fuels management, and public education. Land use regulations can reduce the incidence of wildland fire by addressing defensible space and access for emergency vehicles. Cascade County addresses wildfire in their Growth Policy and Subdivision regulations.

Section 4: Risk Assessment and Vulnerability Analysis

The Cascade County Subdivision Regulations require all subdivisions to be planned, designed, constructed, and maintained to minimize the risk of fire and to permit effective and efficient response in order to protect persons, property, and natural resource areas. Design elements of the subdivision include the placement of structures in such a manner so as to minimize the potential for flame spread and to permit efficient access for firefighting equipment. Areas rated as extreme, high or medium WUI must comply with special design standards including:

- Access and Evacuation – Roadside vegetation must be maintain so roads will service as escape routes and fire breaks. There must be a minimum of two approach routes to ensure one than one escape route and access routes by emergency vehicles. Building Density Requirements - Densities in areas of steep slopes and/or dense forest growth shall be reduced through minimum lot standards.
- Vegetation Management - A vegetation management plan is required that will reduce fuel loading and hazard rating and provide continuous maintenance of the fuel load. The plan must include guidelines for defensible space, fuel breaks and greenbelts, and a plan for continuous maintenance.
- Water Supply – A fire-fighting water source and access to that source must exist and be maintained as defensible space. Requirements for water supply systems are stipulated and may include fire hydrants or storage tanks.
- Fire Protection Covenants are required stipulating that property owners must maintain fire protection water supplies and fire protection systems (defensible spaces, driveway routes, fuel breaks) in perpetuity.

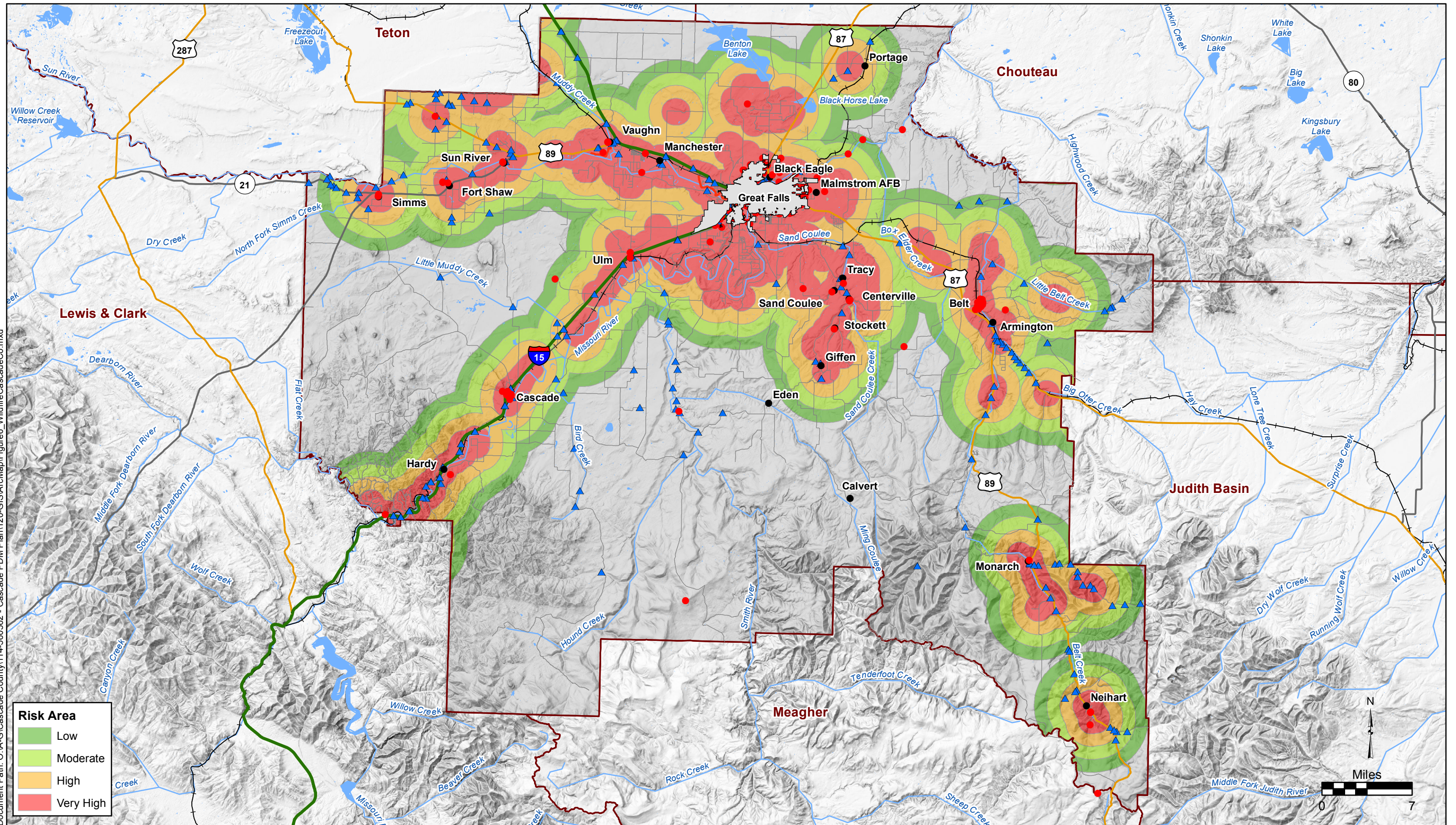
Climate Change

Wildfire is determined by climate variability, local topography, and human intervention. Climate change has the potential to affect multiple elements of the wildfire system: fire behavior, ignitions, fire management, and vegetation fuels. Hot dry spells create the highest fire risk. Increased temperatures may intensify wildfire danger by warming and drying out vegetation. Additionally, changes in climate patterns may impact the distribution and perseverance of insect outbreaks that create dead trees (increase fuel). When climate alters fuel loads and fuel moisture, forest susceptibility to wildfires changes. Climate change also may increase winds that spread fires. Faster fires are harder to contain, and thus are more likely to expand into residential neighborhoods.

Larger, more severe, and more frequent fires may impact the people, property and critical facilities by increasing the risk from ignition from nearby fire sources. Additionally, secondary impacts such as air quality concerns and public health issues from smoke may increase.

Wildfire smoke generates a lot of particulate matter 2.5 microns or less in diameter, known as PM2.5. Those particles are so small, they easily bypass most of the human body's defenses and move directly from the lungs into the bloodstream. A recent study demonstrates that smoke waves are likely to be longer, more intense, and more frequent under climate change, which raises health, ecologic and economic concerns.

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Date: 4/25/2017



Legend

- | | | | | |
|----------------------|---------------------------|-------------------|---------------|-------------------|
| ● Critical Facility* | ▲ Bridge | — U.S. Highway | — Other Route | — Lake/Reservoir |
| ● Place | — Levee Critical Facility | — Montana Highway | — Railroad | — River/Stream |
| ○ County Seat | — Interstate | | | — County Boundary |

*Critical Facilities within Great Falls not shown to clearly illustrate Wildfire Risk area.

Figure 6
Wildfire Risk
Cascade County, Montana
Multi-Hazard Mitigation Plan

4.4 Severe Weather and Drought

Description and History

CPRI SCORES
SEVERE SUMMER WEATHER = 3.1
SEVERE WINTER WEATHER = 2.85
DROUGHT = 2.5

Severe weather hazards have become more significant in recent years due to climate change. Natural resource trends indicate the mean annual precipitation has been below average and the mean annual temperatures have been above average for the past five years. Severe storms are not common; however, thunderstorms, hailstorms, high winds, heavy snow, freezing rain and sleet do occur. Available wind information indicates wind gusts in excess of 60 mph are not uncommon. The trend of variable weather conditions is expected to continue.

The winter weather hazard includes several weather conditions that occur from late fall through early spring in Cascade County (November through April). Snow, blizzards, extended cold and high winds frequently occur together but also occur independent of one another during these months. Severe summer weather includes thunderstorms, wind, hail, lightning, tornadoes, and microbursts that typically occur between May and October of each year. Drought is a consequence of severe weather. Further details on these severe weather hazards are profiled below.

Severe Winter Weather

Winter storms and blizzards follow a seasonal pattern that begins in late fall and lasts until early spring. These storms have the potential to destroy property, and kill livestock and people. Winter storms may be categorized as sleet, ice storms or freezing rain, heavy snowfall or blizzards, and low temperatures. Blizzards are most commonly connected with blowing snow and low visibility. Winter also brings sustained straight line winds that can be well over 50 mph.

A severe winter storm is generally a prolonged event involving snow or ice and extreme cold. The characteristics of severe winter storms are determined by the amount and extent of snow or ice, air temperature, wind speed, and event duration. Severe winter storms create conditions that disrupt essential regional systems such as public utilities, telecommunications, and transportation routes.

A combination of temperatures to 30 below zero and high winds can close roads, threaten disruption of utilities, limit access to rural homes, impede emergency services delivery and close businesses. Such storms also create hazardous travel conditions, which can lead to increased vehicular accidents and threaten air traffic. Additionally, motorists stranded due to closed roads and highways may present a shelter problem.

The National Weather Service provides short-term forecasts of hazardous weather to the public by producing regularly-scheduled severe weather outlooks and updates on various forms of hazardous weather including blizzards and wind chill. Warning and Advisory Criteria for winter weather is presented in **Table 4.4-1**.

Table 4.4-1. Warning and Advisory Criteria for Severe Winter Weather

Winter Weather	Weather Advisory
Winter Storm Watch	Issued to give the public 12-48 hours of advance notice of the potential for snow 6 inches or more in 12 hours or 8 inches or more in 24 hours AND sustained or frequent wind gusts of 25 – 34 mph occasionally reducing visibilities to ¼ mile or less for three hours or more.
Winter Weather Advisory	Issued when a combination of winter weather elements that may cause significant inconveniences are occurring, imminent, or have a high probability of occurring.

Section 4: Risk Assessment and Vulnerability Analysis

Table 4.4-1. Warning and Advisory Criteria for Severe Winter Weather

Winter Weather	Weather Advisory
Winter Storm Warning	Issued when snow 6 inches or more in 12 hours or 8 inches or more in 24 hours AND sustained or frequent wind gusts of 25-34 mph occasionally reducing visibilities to ¼ mile or less for three hours or more are occurring, imminent, or have a high probability of occurring.
Blizzard Watch	Issued to give the public 12-48 hours of advance notice of possible blizzard conditions (sustained winds or frequent gusts of 35 mph or greater and visibilities of less than a quarter mile from falling and/or blowing snow for 3 hours or more).
Blowing Snow Advisory	Issued for visibilities intermittently at or below ½ mile because of blowing snow.
Blizzard Warning	Issued when blizzard conditions (sustained winds or frequent gusts of 35mph or greater and visibilities of less than a quarter mile from falling and/or blowing snow for 3 hours or more) are occurring, imminent, or have a high probability of occurring.
Freezing Rain Advisory	Issued when an accumulation of ice will make roads and sidewalks slippery, but significant and damaging accumulations of ice are not expected.
Ice Storm Warning	Issued when a significant and damaging accumulation of ice is occurring, imminent or has a high probability of occurring.
Snow Advisory	Issued when snow accumulations of 2-5 inches in 12 hours are expected.
Sleet Advisory	Issued when sleet accumulations causing hazardous conditions are expected.
Heavy Snow Warning	Issued when snow accumulations of 6 inches or more in 12 hours or 8 inches or more in 24 hours are expected.
Wind Chill Watch	Issued to give the public 12-48 hours advanced notice of the potential for wind chills of -40°F or colder with a wind speed of 10 mph or higher and a duration of 6 hours or more.
Wind Chill Advisory	Issued when wind chills of -20°F to -39°F with a wind speed of 10 mph or higher and a duration of 6 hours or more are expected.
Wind Chill Warning	Issued when wind chills of -40°F or colder with a wind 10 mph wind in combination with precipitation.

Source: National Weather Service (NWS, 2016)

Snow storms and bitterly cold temperatures are common occurrences in Cascade County and generally do not cause any problems as residents are used to winter weather and are prepared for it. Sometimes, however, blizzards can occur and overwhelm the ability to keep roads passable. Heavy snow and ice events also have the potential to bring down power lines and trees. Extreme wind chill temperatures may harm residents if unprotected outdoors or if heating mechanisms are disrupted.

State-wide winter storm disasters including Cascade County were declared in 1978, 1989 and 1996.

Table 4.4-2 presents the severe winter weather events in Cascade County since 2005.

Table 4.4-2. Cascade County Severe Winter Weather Reports (~November-April)

Date	Event	Date	Event	Date	Event	Date	Event
1/12/2005	Blizzard	6/10/2008	Heavy Snow	1/5/2012	High Wind	1/10/2012	Heavy Snow
1/18/2005	High Wind	6/11/2008	Heavy Snow	1/18/2012	Winter Storm	1/3/2014	High Wind
3/14/2005	Heavy Snow	11/12/2008	High Wind	1/25/2012	High Wind	1/11/2014	High Wind
3/17/2005	Winter Storm	12/13/2008	Blizzard	1/29/2012	High Wind	1/13/2014	High Wind
3/23/2005	Winter Storm	1/28/2009	High Wind	2/20/2012	Winter Storm	1/14/2014	High Wind
4/18/2005	Winter Storm	1/31/2009	High Wind	3/3/2012	High Wind	1/15/2014	High Wind
11/27/2005	Heavy Snow	3/28/2009	Winter Storm	3/13/2012	High Wind	1/19/2014	High Wind
12/5/2005	Winter Storm	4/14/2009	Winter Storm	3/19/2012	Winter Storm	1/26/2014	High Wind
12/14/2005	Heavy Snow	4/27/2009	Winter Storm	3/30/2012	High Wind	1/29/2014	Heavy Snow
1/10/2006	High Wind	10/27/2009	Heavy Snow	4/27/2012	Winter Storm	2/10/2014	High Wind
2/1/2006	High Wind	12/4/2009	Winter Storm	11/8/2012	Heavy Snow	2/12/2014	High Wind
3/19/2006	Heavy Snow	12/21/2009	Ice Storm	11/9/2012	Blizzard	2/14/2014	High Wind
4/2/2006	Heavy Snow	1/22/2010	Winter Storm	11/19/2012	High Wind	2/16/2014	High Wind
9/16/2006	Heavy Snow	3/29/2010	High Wind	12/5/2012	High Wind	2/23/2014	Heavy Snow

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Table 4.4-2. Cascade County Severe Winter Weather Reports (~November-April)

Date	Event	Date	Event	Date	Event	Date	Event
11/7/2006	High Wind	3/30/2010	Winter Storm	12/7/2012	Heavy Snow	2/27/2014	Heavy Snow
11/13/2006	High Wind	4/3/2010	High Wind	12/20/2012	High Wind	3/1/2014	Cold/Wind Chill
11/16/2006	High Wind	4/8/2010	High Wind	1/7/2013	High Wind	3/10/2014	Heavy Snow
11/25/2006	Heavy Snow	4/13/2010	Winter Storm	1/10/2013	Heavy Snow	3/17/2014	Heavy Snow
12/13/2006	High Wind	4/29/2010	Winter Storm	1/17/2013	High Wind	4/24/2014	High Wind
12/15/2006	High Wind	11/1/2010	High Wind	1/24/2013	High Wind	11/6/2014	High Wind
12/28/2006	Heavy Snow	11/7/2010	Winter Storm	2/9/2013	Heavy Snow	11/9/2014	Heavy Snow
1/2/2007	High Wind	11/15/2010	Winter Storm	2/12/2013	High Wind	11/22/2014	High Wind
1/6/2007	High Wind	11/16/2010	High Wind	2/17/2013	Heavy Snow	11/25/2014	Heavy Snow
1/7/2007	High Wind	12/19/2010	Winter Storm	3/3/2013	Heavy Snow	11/28/2014	Heavy Snow
2/15/2007	High Wind	12/29/2010	Winter Storm	4/27/2013	High Wind	12/27/2014	Heavy Snow
3/12/2007	High Wind	1/16/2011	High Wind	4/29/2013	High Wind	1/5/2015	Heavy Snow
4/1/2007	Heavy Snow	1/23/2011	High Wind	11/7/2013	High Wind	1/16/2015	High Wind
5/22/2007	Heavy Snow	2/4/2011	Winter Storm	11/15/2013	High Wind	1/18/2015	High Wind
11/3/2007	High Wind	2/6/2011	Winter Storm	12/2/2013	Heavy Snow	2/6/2015	High Wind
11/12/2007	High Wind	2/12/2011	High Wind	12/6/2013	Cold/Wind Chill	3/28/2015	High Wind
11/18/2007	Heavy Snow	3/10/2011	High Wind	12/10/2013	High Wind	11/3/2015	Winter Storm
1/4/2008	High Wind	4/7/2011	Winter Storm	12/12/2013	High Wind	11/13/2015	High Wind
1/17/2008	Heavy Snow	4/21/2011	Winter Storm	12/14/2013	High Wind	11/17/2015	High Wind
1/19/2008	Heavy Snow	6/2/2011	Winter Storm	12/17/2013	High Wind	11/24/2015	Winter Storm
1/28/2008	Winter Storm	11/12/2011	High Wind	12/18/2013	High Wind	12/9/2015	High Wind
3/4/2008	Heavy Snow	11/23/2011	High Wind	12/23/2013	High Wind	12/13/2015	Winter Storm
3/11/2008	High Wind	11/27/2011	High Wind	12/25/2013	High Wind	2/6/2016	High Wind
3/24/2008	High Wind	11/30/2011	Winter Storm	12/26/2013	High Wind	2/18/2016	High Wind
3/29/2008	Winter Storm	12/2/2011	High Wind	12/27/2013	High Wind	4/6/2016	High Wind
4/5/2008	Heavy Snow	12/3/2011	Winter Storm	12/28/2013	High Wind	4/15/2016	Winter Storm
4/19/2008	Heavy Snow	12/28/2011	High Wind	12/31/2013	Heavy Snow	5/9/2016	Winter Storm

Source: NCDC, 2016.

Project stakeholders identified several instances of severe winter weather causing damages or threatening the wellbeing of Cascade County residents since the 2011 PDM Plan was adopted, as listed below.

December 8, 2013 – People in Great Falls were in one of the coldest places in the world on the night of December 8th. According to the National Weather Service, the coldest place in Montana was Great Falls. Temperatures of 43 degrees below zero were reported in the Chinook Airport during the night. Fort Peck was 37 below. “I can’t officially say that the coldest place on Earth was Great Falls, but in the Northern Hemisphere, it’s pretty close”. (Missoulia, *Great Falls One of the Coldest, if not the Coldest, Spot on Earth Saturday*, December 8, 2013). Project stakeholders indicated that the sub-zero temperatures lasted several days and warming shelters were opened in Great Falls.

November 17, 2015 – Damaging winds left Great Falls and Vaughn residents in the dark. The National Weather Service reported numerous power outages with visible transformer flashes across Great Falls. High winds with gusts around 60 mph occurred in advance of the arrival of a cold front. NorthWestern Energy reported 1,500 customers without power in the Great Falls city center with reports of poles down in outlying areas. (www.kpax.com, *Power Outages Reported in and around Great Falls*, November 17, 2015).

April 15, 2016 – A record-setting spring storm dropped more than 6 inches of snow on Great Falls, knocked out power to thousands of NorthWestern Energy customers in northcentral Montana and snapped dozens of power poles. Between 3,500 and 4,000 were without power at the peak of the storm including residents in Cascade, Ulm and Great Falls. Due to the weight of the heavy snow and wind, NorthWestern Energy lost 67 power poles in the storm including 10 on Black Eagle Road north of Great Falls. According to the Montana Dept. of Transportation, several semi-trucks spun out and were blocking Interstate 15 between Vaughn and Power. (Great Falls Tribune, *Record-setting Storm Leaves Thousands without Power*, April 15, 2016).

Severe Summer Weather

A severe thunderstorm is defined by the National Weather Service as a thunderstorm that produces wind gusts at or greater than 58 mph (50 knots), hail 1-inch or larger, and/or tornadoes. Thunderstorms can also produce intense downbursts, lightning, and microburst wind. Strong winds can occur outside of thunderstorms when the overall weather conditions are favorable.

Tornadoes are the most concentrated and violent storms produced by the earth's atmosphere. They are created by a vortex of rotating wind and strong vertical motion, which possess remarkable strength and can cause widespread damage. The most violent tornadoes are capable of tremendous destruction with wind speeds of 300 mph or more. Maximum wind speeds in tornadoes are confined to small areas and vary over short distances. Thunderstorms can produce deadly and damaging tornadoes. As of February 1, 2007, the NWS began using the Enhanced Fujita Scale for Tornado damage. Tornadoes are not common in Cascade County but high winds occur frequently.

A microburst is a very localized column of sinking air, producing damaging divergent and straight-line winds at the surface that are similar to, but distinguishable from, tornadoes. The scale and suddenness of a microburst makes it a great danger to aircraft due to the low-level wind shear caused by its gust front, with several fatal crashes having been attributed to the phenomenon over the past several decades. Microbursts in forested regions have flattened acres of standing timber.

The NWS provides short-term forecasts and warnings of severe summer weather to the public by producing regularly-scheduled severe weather outlooks and updates on various forms of hazardous weather including tornado warnings, as shown in **Table 4.4-3**.

Table 4.4-3. Warning and Advisory Criteria for Severe Summer Weather

Summer Weather	Weather Advisory
Hazardous Weather Outlook	Hazardous weather outlooks alert the public to the possibility for severe weather in the area from one to seven days in advance.
Severe Thunderstorm Watch	Issued when conditions for severe thunderstorms appear favorable for an area over the next several hours. Watches are typically in effect for 4-6 hours.
Severe Thunderstorm Warning	Issued when Doppler radar indicates or the public reports a thunderstorm with wind gusts of 58 mph or greater and/or hail 1-inch or larger in diameter. The warning is usually valid for 30-60 minutes.
High Wind Watch	Issued when conditions are favorable for non-thunderstorm sustained winds of 40 mph or greater or gusts of 58 mph or greater for a period of one hour or more, but the timing, location, and/or magnitude are still uncertain.
High Wind Warning	Issued when non-thunderstorm sustained winds of 40 mph or greater or gusts of 58 mph or greater for a period of one hour or more are expected.
Tornado Watch	Issued when conditions for tornadoes appear especially favorable for an area over the next several hours. Watches are typically in effect for 4-6 hours.

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Table 4.4-3. Warning and Advisory Criteria for Severe Summer Weather

Summer Weather	Weather Advisory
Tornado Warning	Issued when Doppler radar indicates or the public reports a tornado. The warning is usually valid for 15-45 minutes.

Source: National Weather Service (NWS, 2016)

There have been no Presidential Disaster Declarations or State Disasters issued for the severe summer weather hazard in Cascade County. However, since the 2011 Cascade County PDM Plan was completed, numerous incidents of severe summer weather have affected the county. **Table 4.4-4** presents severe summer storm events from the NCDC database indicating the magnitude of these events.

Table 4.4-4. Cascade County Severe Summer Weather Reports (~May-October)

Date	Event	Magnitude	Date	Event	Magnitude	Date	Event	Magnitude
6/14/1955	Hail	0.75 in	7/2/1990	Tstorm Wind	75 kts	6/6/2004	Hail	1.75 in
7/18/1955	Tstorm Wind	60 kts	7/5/1990	Tstorm Wind	59 kts	6/23/2004	Hail	0.75 in
7/1/1957	Hail	1 in	8/20/1990	Hail	1.5 in	6/29/2004	Lightning	-
7/14/1957	Tstorm Wind	70 kts	6/25/1991	Hail	1 in	8/4/2004	Hail	1.5 in
6/4/1958	Tornado	-	7/14/1991	Hail	1.75	8/5/2004	Hail	1 in
6/6/1958	Hail	0.75 in	6/10/1992	Tstorm Wind	50 kts	6/16/2005	Tstorm Wind	56 kts
6/27/1958	Tstorm Wind	65 kts	8/2/1992	Hail	1.25 in	6/22/2005	Hail	0.75 in
7/18/1958	Hail	0.75 in	8/23/1992	Hail	1.25 in	6/25/2005	Hail	1.75 in
6/19/1960	Hail	1.75 in	8/20/1993	Hail	0.75 in	8/1/2005	Lightning	-
6/29/1961	Tornado	-	4/21/1994	Tstorm Wind	53 kts	5/22/2006	Tstorm Wind	52 kts
7/6/1961	Hail	1 in	5/27/1994	Tstorm Wind	70 kts	6/4/2006	Funnel Cloud	-
6/28/1963	Hail	1.5 in	6/11/1995	Hail	1 in	7/23/2006	Tstorm Wind	57 kts
7/24/1963	Tornado	-	6/12/1995	Hail	1 in	7/24/2006	Funnel Cloud	-
2/27/1965	Tstorm Wind	53 kts	6/15/1995	Hail	1.75 in	8/29/2006	Lightning	-
6/24/1965	Hail	0.75 in	6/16/1995	Hail	1 in	5/10/2007	Hail	1 in
7/10/1965	Hail	2.75 in	8/7/1995	Hail	0.75 in	6/16/2007	Hail	1.75 in
7/3/1967	Hail	0.75 in	4/9/1996	Tstorm Wind	55 kts	6/24/2007	Hail	2 in
7/31/1967	Tstorm Wind	54 kts	5/14/1996	Tstorm Wind	68 kts	7/7/2007	Hail	1 in
6/19/1968	Tstorm Wind	55 kts	6/15/1996	Hail	1 in	7/9/2007	High Wind	50 kts
8/4/1968	Tstorm Wind	-	6/17/1996	Hail	0.75 in	8/19/2007	Tstorm Wind	54 kts
8/11/1968	Tstorm Wind	54 kts	6/25/1996	Hail	1 in	4/29/2008	Tstorm Wind	80 kts
8/14/1969	Tstorm Wind	55 kts	7/4/1996	Hail	0.75 in	5/28/2008	Tstorm Wind	52 kts
8/18/1969	Tstorm Wind	50 kts	12/10/1996	Tstorm Wind	58 kts	6/1/2008	Tstorm Wind	52 kts
6/27/1970	Tstorm Wind	73 kts	5/7/1997	Hail	0.75 in	7/4/2008	Hail	1.25 in
6/29/1970	Hail	0.88 in	6/6/1997	Hail	2.75 in	8/8/2008	Tstorm Wind	56 kts
8/20/1971	Tstorm Wind	50 kts	6/28/1997	Hail	1.25 in	8/9/2008	Tstorm Wind	52 kts
8/31/1971	Tstorm Wind	50 kts	8/7/1997	Hail	1 in	7/6/2009	Hail	1.75 in
7/24/1972	Tstorm Wind	56 kts	8/28/1997	Hail	1 in	7/12/2009	Tstorm Wind	52 kts
3/1/1973	Tstorm Wind	56 kts	9/15/1997	Hail	0.75 in	7/13/2009	Tstorm Wind	52 kts
6/22/1973	Tstorm Wind	53 kts	10/4/1997	High Wind	80 kts	5/4/2010	High Wind	51 kts
8/13/1973	Tstorm Wind	62 kts	7/3/1998	Tornado	1 in	6/29/2010	Tstorm Wind	54 kts
6/20/1974	Hail	1.75 in	7/4/1998	Hail	0.75 in	8/6/2010	Tstorm Wind	60 kts
6/30/1975	Tornado	F2	8/7/1998	Hail	1.75 in	5/15/2011	High Wind	56 kts
7/15/1975	Tstorm Wind	50 kts	8/20/1998	Tstorm Wind	52 kts	6/6/2011	Hail	1.5 in
6/3/1976	Hail	0.75 in	8/23/1998	Tstorm Wind	50 kts	6/23/2011	Hail	1.75 in
6/6/1976	Tstorm Wind	52 kts	9/9/1998	Tstorm Wind	54 kts	6/28/2011	Tstorm Wind	52 kts
6/10/1976	Hail	0.75 in	9/9/1998	Tstorm Wind	66 kts	6/28/2011	Tstorm Wind	59 kts

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Table 4.4-4. Cascade County Severe Summer Weather Reports (~May-October)

Date	Event	Magnitude	Date	Event	Magnitude	Date	Event	Magnitude
7/11/1976	Tstorm Wind	54 kts	7/7/1999	High Wind	57 kts	7/13/2011	Tstorm Wind	61 kts
6/1/1977	Tornado	-	7/21/1999	Hail	1 in	7/30/2011	Tstorm Wind	52 kts
6/28/1978	Hail	2 in	8/31/1999	High Wind	53 kts	6/4/2012	Hail	1.75 in
6/29/1978	Hail	1.5 in	9/25/1999	High Wind	35 kts	6/26/2012	High Wind	50 kts
7/3/1978	Tornado	-	10/8/1999	High Wind	67 kts	7/6/2012	Tstorm Wind	55 kts
7/16/1978	Tstorm Wind	-	10/31/1999	High Wind	71 kts	7/26/2012	Tstorm Wind	57 kts
8/22/1978	Hail	1 in	1/16/2000	Tstorm Wind	57 kts	7/30/2012	Tstorm Wind	64 kts
6/30/1979	Hail	1 in	6/5/2000	Tstorm Wind	52 kts	10/16/2012	High Wind	51 kts
7/6/1979	Tstorm Wind	64 kts	6/15/2000	Hail	0.75 in	5/10/2013	High Wind	51 kts
5/26/1980	Tornado	-	7/5/2000	Tornado	F0	6/13/2013	Hail	1 in
6/9/1980	Tstorm Wind	52 kts	7/6/2000	Hail	1.25 in	6/18/2013	Hail	1 in
6/10/1980	Hail	1 in	7/8/2000	Hail	2 in	6/19/2013	Heavy Rain	-
6/25/1980	Tstorm Wind	65 kts	8/11/2000	Hail	1.75 in	7/5/2013	Tstorm Wind	58 kts
8/4/1981	Hail	1.5 in	9/4/2000	Hail	0.75 in	7/8/2013	Hail	1 in
8/19/1981	Tstorm Wind	67 kts	9/5/2000	Hail	1 in	7/17/2013	Hail	1 in
8/20/1981	Tstorm Wind	50 kts	5/8/2001	Tstorm Wind	50 kts	7/24/2013	Hail	1.25 in
8/27/1981	Tstorm Wind	52 kts	5/16/2001	High Wind	50 kts	8/3/2013	Hail	1 in
6/28/1982	Hail	2 in	6/27/2001	Tstorm Wind	62 kts	8/10/2013	Heavy Rain	-
8/10/1982	Tstorm Wind	54 kts	7/12/2001	Tstorm Wind	61 kts	8/28/2013	Tstorm Wind	50 kts
8/11/1982	Hail	2.5 in	7/16/2001	Tstorm Wind	52 kts	9/5/2013	Tstorm Wind	54 kts
4/24/1983	Tstorm Wind	-	7/17/2001	Hail	0.88 in	9/6/2013	Hail	1.75 in
7/6/1983	Hail	0.75 in	7/28/2001	Tstorm Wind	69 kts	9/7/2013	Hail	1.75 in
7/25/1983	Tstorm Wind	50 kts	8/4/2001	Hail	0.75 in	9/8/2013	Hail	2 in
8/3/1983	Tstorm Wind	50 kts	10/12/2001	High Wind	64 kts	9/28/2013	High Wind	52 kts
8/10/1983	Tstorm Wind	60 kts	10/23/2001	High Wind	61 kts	9/29/2013	High Wind	50 kts
5/14/1984	Tstorm Wind	61 kts	10/31/2001	High Wind	54 kts	9/30/2013	High Wind	66 kts
5/15/1984	Hail	1 in	6/21/2002	Tstorm Wind	52 kts	5/4/2014	Hail	1.75 in
5/30/1984	Tstorm Wind	-	6/27/2002	Tstorm Wind	61 kts	5/15/2014	Hail	1.75 in
8/24/1984	Tstorm Wind	60 kts	7/6/2002	Tstorm Wind	61 kts	5/28/2014	Hail	1.5 in
5/25/1985	Hail	1.5 in	7/8/2002	Tstorm Wind	87 kts	5/31/2014	Hail	1 in
5/28/1985	Hail	1 in	7/14/2002	Tstorm Wind	57 kts	6/12/2014	Hail	0.88 in
6/20/1985	Tstorm Wind	71 kts	7/17/2002	Tstorm Wind	52 kts	6/12/2014	Hail	1.75 in
8/8/1985	Hail	0.75 in	7/23/2002	Tstorm Wind	61 kts	6/16/2014	Heavy Rain	-
8/27/1985	Hail	1 in	8/5/2002	Hail	1.75 in	6/17/2014	Heavy Rain	-
7/24/1987	Hail	1 in	8/16/2002	High Wind	63 kts	6/18/2014	Heavy Rain	-
5/16/1988	Tstorm Wind	52 kts	10/5/2002	High Wind	62 kts	7/14/2014	Heavy Rain	-
5/24/1988	Hail	0.75 in	4/12/2003	Hail	1.25 in	7/15/2014	Heavy Rain	-
6/17/1988	Tstorm Wind	63 kts	5/16/2003	High Wind	56 kts	7/22/2014	Heavy Rain	-
7/3/1988	Tstorm Wind	64 kts	6/10/2003	Hail	1.75 in	8/15/2014	Hail	0.75 in
7/5/1988	Tornado	F1	6/15/2003	Hail	0.75 in	8/22/2014	Heavy Rain	-
4/21/1989	Tstorm Wind	-	6/19/2003	Tstorm Wind	61 kts	8/23/2014	Heavy Rain	-
5/10/1989	Tstorm Wind	50 kts	6/20/2003	Hail	0.75 in	8/14/2015	Tstorm Wind	57 kts
7/15/1989	Tstorm Wind	50 kts	7/16/2003	Tstorm Wind	55 kts	8/29/2015	Tstorm Wind	51 kts
7/20/1989	Tstorm Wind	54 kts	8/8/2003	Funnel Cloud	-	10/11/2015	High Wind	50 kts
7/26/1989	Tstorm Wind	-	10/29/2003	High Wind	50 kts	10/30/2015	High Wind	51 kts
7/30/1989	Tstorm Wind	50 kts	5/8/2004	Tstorm Wind	57 kts	6/10/2016	Hail	1 in
6/28/1990	Hail	0.75 in	6/5/2004	Tstorm Wind	52 kts	6/11/2016	Hail	1.5 in

Source: NCDC, 2016.

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The State of Montana's Multi-Hazard Mitigation Plan and Statewide Hazard Assessment (2010) reports that Cascade County ranks 6th among counties with the highest frequency of tornado, wind, and hail events. In addition, Cascade County ranks 9th in incidents of thunderstorm winds in excess of 75 mph. There have been no Presidential Disaster Declarations or State Disasters issued for the severe summer weather in Cascade County. Project stakeholders indicated that big winds from the east (non-prevailing wind direction) take out trees and power lines several time per year in Cascade County. A hail/microburst event on June 11-13, 2013 in the Town of Cascade caused roof and exterior paint damage on a number of residences. Basements were flooded and rainwater backwashed into the municipal pool. A sequence of severe summer weather events in 2016 are summarized below.

June 11, 2016. Great Falls had a rude awakening at 5 a.m. when a storm came in from the west and dropped 1 to 1.5 inch hail over the city. According to the National Weather Service, at one inch, you see damage to cars and siding, shingles. At 1.5 to 2 inches, you see more substantial damage to trees, broken windows. (Great Falls Tribune, *Great Falls Wakes up Early to 1 to 1.5 Inch Hail*, June 11, 2016). A project stakeholder with the City of Great Falls reported that 175 city vehicles were damaged.

August 9, 2016. Heavy rain deluged Great Falls and caused widespread flooding of city streets. Stormwater drains were overwhelmed and cars stalled in many locations. The storm put down a lot of rainfall in a short amount of time and was moving slowly enough where it dumped over town for about 30 minutes. The heavy rain was accompanied by high winds and hail and caused extensive property damage. Radar indicated that some locations in Great Falls received more than an inch of rain. (Great Falls Tribune, *Heavy Rain Floods Great Falls*, August 9, 2016).

August 18, 2016. Hail damaged hundreds of vehicles across Great Falls. Much of the damage was to hoods and roofs of vehicles, with some needing an entire new hood or roof. State Farm Insurance received 26 vehicle claims and 15 claims for damage to homes the day after the storm, and an additional 20 to 30 car claims and another 10 to 15 home claims had yet to be filed. Cascade County reported more than 20 county vehicles were damaged. A streetlight broke and crashed onto a car at the City-County Health Department. (Great Falls Tribune, *Mayhem: Repair Shops, Insurance Agencies Hopping after Hail*, August 18, 2016).

Drought

Drought is an extended period of unusually dry weather and is a special type of disaster because its occurrence does not require evacuation of an area nor does it constitute an immediate threat to life or property. People are not suddenly rendered homeless or without food and clothing. The basic effect of a drought is economic hardship, but it does, in the end, resemble other types of disasters in that victims can be deprived of their livelihoods and communities can suffer economic decline.

The effects of drought become apparent when they are in longer duration because more and more moisture-related activities are affected. Non-irrigated croplands are most susceptible to moisture shortages. Rangeland and irrigated agricultural lands do not feel the effects as quickly as the non-irrigated, cultivated acreage, but their yields can also be greatly reduced due to drought.

Typically, droughts are not declared disasters in the same way as a Presidential Disaster Declaration; rather, they are declared but by the Secretary of the Department of Agriculture. Conservation

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Reserve Program (CRP) grazing may be opened to livestock owners for feed but other than this, the only real help for producers and growers is the fact that federal low interest loans are made available.

In periods of severe drought, range fires can destroy the economic potential of the agricultural industry, and wildlife habitat in, and adjacent to, the fire areas. Under extreme drought conditions, lakes, reservoirs, and rivers can be subject to severe water shortages. Insect infestation is an additional hazard resulting from drought. **Table 4.4-5** presents the NWS warnings and advisories that relate to drought.

Table 4.4-5. Warning and Advisory Criteria for Drought

Summer Weather Warning	Warning Description
Blowing Dust Advisory	Issued for widespread or localized blowing dust reducing visibilities to less than a mile but greater than ¼ mile with sustained winds of 25 mph or greater.
Dust Storm Warning	Issued when widespread or localized blowing dust reduces visibilities to less than ¼ mile with sustained winds of 25 mph or greater.
Heat Advisory	Issued when conditions are favorable for heat index values reaching 105 degrees or greater for three days or more.
Heat Warning	Issued when high temperatures are expected to be over 105 degrees and low temperatures are expected to be over 80 degrees for three days or more.

Source: National Weather Service (NWS, 2016)

The State of Montana established a Drought Advisory Committee and developed a Drought Plan to address the hazard. Information from the National Drought Mitigation Center also identifies Montana as a drought prone state. Temperatures can reach 100°F in the summer with extremely low humidities and high winds. Such dry, hot conditions contribute to drought conditions.

The history of drought in Montana, as presented in the State of Montana Natural Hazards Mitigation Plan (DES, 2001) is summarized below.

Historical information has been obtained from the State DES website and modified to reflect the conditions in Cascade County. In the 1930's, the "Dust Bowl" drought affected the State of Montana, including Cascade County. This nationwide drought produced erosion problems in the creation of dust storms throughout the State. Again in the mid 1950's, Montana had a period of reduced rainfall.

Drought struck Cascade County again in 1961, and by July, the State's Crop and Livestock Reporting Service called it the worst drought since the 1930's. Better conservation practices such as strip cropping were used to lessen the impacts of the water shortages. Five years later in 1966, the entire state was experiencing yet another episode of drought. Although water shortages were not as great as in 1961, a study of ten weather recording stations across Montana showed all had recorded below normal precipitation amounts for a ten month period.

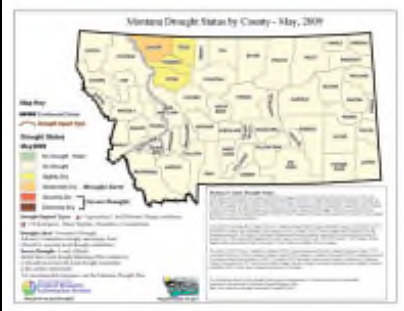


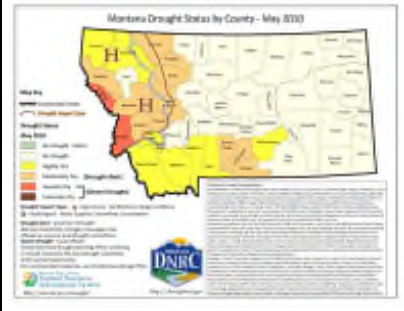

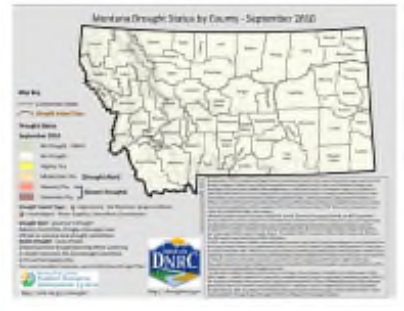

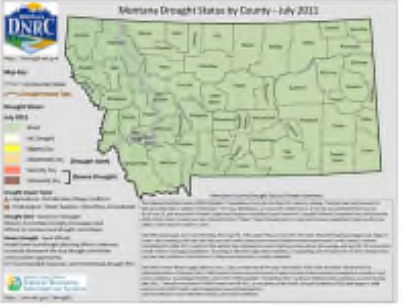
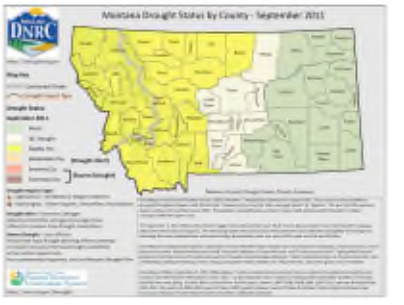
Then in the 1970's, a seven month survey ending in May of 1977 estimated that over 250,000 acres of Montana farmland had been damaged by winds. Inadequate crop cover and excessive tillage practices had resulted in exaggerated soil damage due to low soil moisture. The State of Montana began taking protective measures to conserve water.

Cascade County was severely affected by drought again in 1985 and received a federal drought disaster declaration. For a typical 2,500 acre Montana farm/ranch, the operator lost more than \$100,000 in equity over the course of that year. The state's agriculture industry lost nearly \$3 billion in equity.

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Cascade County had drought conditions from 2000 through 2007 and received several USDA Disaster Declarations since then. The State of Montana received a total of \$152.4 million in disaster assistance from the Farm Service Agency in 2004, 2005, and 2006. This history shows that the county experiences drought almost once every decade and the drought may last for several years. Since the Cascade County PDM Plan was completed in 2011, severe drought conditions have not impacted the county.

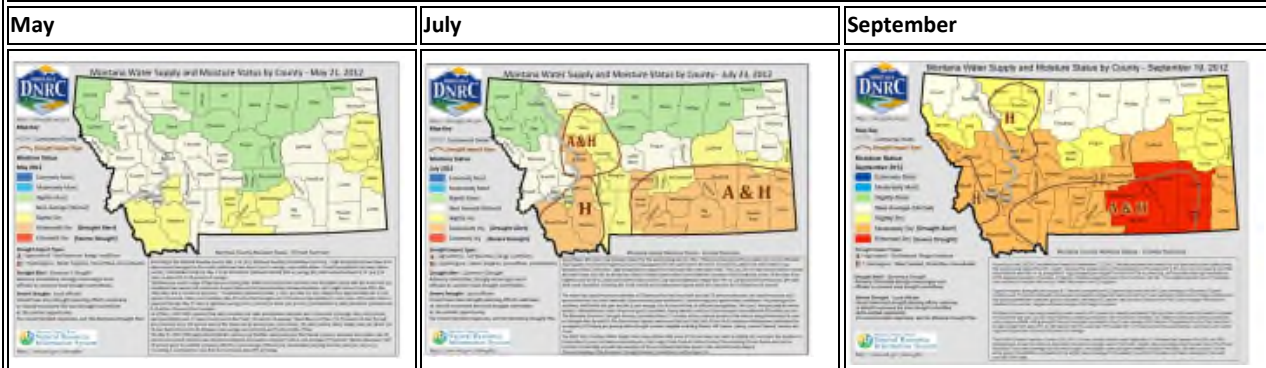
Table 4.4-6 shows the Montana drought status for the period 2007-2015. **Table 4.4-7** summarizes drought conditions in Cascade County during this period.

Table 4.4-6. Montana Drought Status; 2009 – 2016		
2009 Montana County Drought Status		
May	July	September
		
2010 Montana County Drought Status		
May	July	September
		
2011 Montana County Drought Status		
May	July	September
		

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Table 4.4-6. Montana Drought Status; 2009 – 2016

2012 Montana County Drought Status



2013 Montana County Drought Status

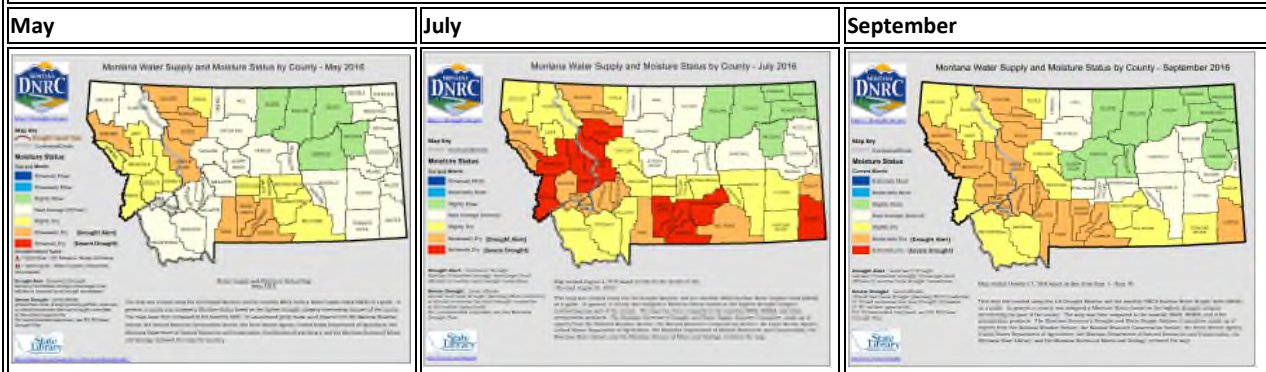


2014 Montana County Drought Status



2015 Montana County Drought Status



Table 4.4-6. Montana Drought Status; 2009 – 2016
2016 Montana County Drought Status


Source: Montana Drought Website, 2016. https://mslservices.mt.gov/Geographic_Information/Maps/drought/

Table 4.4-7. Cascade County Drought Summary

Moisture	Alerts	2009			2010			2011			2012			2013			2014			2015			2016		
		May	July	Sept	May	July	Sept	May	July	Sept	May	July	Sept	May	July	Sept	May	July	Sept	May	July	Sept	May	July	Sept
Moderately Moist																									
Slightly Moist																									
No Drought																									
Slightly Dry																									
Moderately Dry	Drought Alert																								
Extremely Dry	Severe Drought																								

Vulnerability and Area of Impact

Based on review of historic weather data, the entire project area has been classified with a uniform risk for severe weather events. Structures, utilities, and vehicles are most at risk from the wind component of these storms, with crops and livestock being additionally threatened by hail. Winter storm events may affect the higher regions with more snowfall but the population is concentrated in the lower elevations so the hazard risk area is considered uniform for the entire county.

Drought affects all facets of our society, from food production to water quality to public health, and there is a growing need to help communities, agriculture, businesses, and individuals threatened by drought to plan accordingly. From 1980-2000, major droughts and heat waves within the U.S. alone resulted in costs exceeding \$100 billion. In 2012, approximately two-thirds of the continental U.S. was affected by chronic drought. Severe droughts are projected for the next several decades, impacting the nation's communities and economy (NDRP, 2016).

Drought is a hazard that does not normally cause structural damage but can have significant population and economic effects. Cascade County communities rely on water for irrigation and public water supplies. A drought or blight could also have significant impacts on the agricultural community. Economic losses could result from loss of pasture and food supply for livestock. These losses would be in addition to those losses associated with lower crop yields due to drought conditions.

Another major impact of drought is to the natural resources of the area. As river and stream levels drop, fish populations and other natural resources are impacted. A hazard directly related to drought is wildfire. Drought conditions increase the chances that a major wildfire will threaten the

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community. Unlike many other events, drought evolves slowly, and therefore, the direct impact to the population (i.e. loss of life, injuries) would be low.

On March 21, 2016, President Obama signed a Presidential Memorandum directing Federal agencies to build national capabilities for long-term drought resilience. The President tasked the National Drought Resilience Partnership (NDRP) to work collaboratively to deliver on a Federal Action Plan including six goals and 27 associated actions to promote drought resilience nationwide. Importantly, these goals reflect many of the priorities identified by the on-the-ground leaders and experts who work daily to build a more resilient future for their communities. The actions are designed to complement state, regional, tribal and local drought preparedness, planning and implementation efforts.

Federal agencies have mobilized to provide improved information and data, emergency and planning assistance, landscape-scale land management improvements, and investments in new technologies and approaches to water resource management. Continued drought conditions in the West and projections of more extreme droughts in the future underscore the urgency to pursue long term solutions for protecting our water resources and the communities and ecosystems that depend on them. In partnership with the Montana DNRC and other state and local collaborators, the Missouri Headwaters Basin was selected as a national drought resilience pilot project. Partners are leveraging multiple resources to engage communities in drought preparedness planning and to implement projects that build resiliency. Goals of the project include:

- Providing tools for monitoring, assessing and forecasting;
- Developing local and regional capacity to plan for drought; and,
- Implementing local projects to build regional resilience.

Probability and Magnitude

Table 4.4-8 and 4.4-9 present severe weather events with reported damages from winter and summer events, respectively, from the SHELDUS and NCDC databases. The dataset used to populate SHELDUS typically includes every loss causing and/or deadly event between 1960 through 1975 and from 1995 onward. Between 1976 and 1995, SHELDUS reflects only events that caused at least one fatality or more than \$50,000 in property or crop damages. The NCDC data contains sporadic damage figures which were added to the dataset when they represented a unique damaging event.

Table 4.4-8. Cascade County Severe Winter Weather Events with Damages

Date	Injuries	Fatalities	Property Damage (2016 \$)	Crop Damage (2016 \$)	Remarks
2/25/1961	0	0	\$859	\$859	High wind
3/1/1961	0.04	0	\$1,682	\$0	High wind
12/21/1961	0.07	0	\$96	\$0	High wind and thunderstorms
1/25/1962	0	0	\$1,738	\$0	High wind
2/22/1962	0	0	\$78	\$0	High wind, snow, blowing snow,
11/20/1962	0.07	0	\$7,013	\$0	High winds
2/1/1963	0.04	0	\$146	\$0	Freezing rain, high wind, snow
11/27/1963	1	0	\$0	\$0	Wind
4/5/1964	0	0	\$32	\$0	Snow and drifting snow
5/3/1964	0	0.04	\$14,422	\$0	Snow and high wind

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Table 4.4-8. Cascade County Severe Winter Weather Events with Damages

Date	Injuries	Fatalities	Property Damage (2016 \$)	Crop Damage (2016 \$)	Remarks
12/16/1964	0	0	\$68,316	\$0	High wind, blowing snow, severe
1/15/1967	0	0	\$6,341	\$0	High wind
1/19/1967	0	0	\$2,008	\$0	High wind
12/31/1967	0	0	\$90	\$0	Blowing snow
1/31/1969	0	0	\$577	\$0	Cold and snow
1/26/1969	0	0	\$6	\$0	Lightning
3/3/1971	0	0	\$994	\$0	Wind, snow
11/30/1971	0.37	0	\$1,104	\$0	Hoarfrost, ice
1/11/1972	0	0	\$5,066	\$0	Strong winds
1/16/1972	0	0	\$9,626	\$0	Strong winds
2/16/1972	0	0	\$996	\$0	High wind
3/6/1972	0	0	\$963	\$0	High winds
3/24/1973	0	0	\$129	\$0	Snow storm and blizzard
4/20/1973	0	0	\$56,641	\$0	Blizzard
11/16/1973	0	0	\$27,188	\$0	Wind
1/30/1974	0	0	\$4,372	\$0	Wind
12/31/1974	0	0	\$844	\$0	High winds
4/9/1975	0	0	\$46,745	\$0	Winter storm (severe blizzard)
12/29/1978	0	1	\$0	\$0	Cold, snow
12/4/1979	0	0	\$18,475	\$0	Wind
12/14/1979	0	0	\$18,475	\$0	Wind
10/12/1981	0	0	\$6,989	\$0	Wet and heavy snow
4/24/1983	0	0	\$30	\$0	Strong winds
11/15/1986	0.2	0.2	\$22	\$0	High wind
11/23/1986	0	0	\$85	\$0	High winds
4/13/1987	0	0	\$177	\$0	High wind
4/15/1987	0	0	\$1,771	\$0	High wind
12/9/1987	0	0	\$590	\$0	High wind
1/22/1988	0	0	\$78	\$0	High winds
2/15/1988	0	0	\$182	\$0	High winds
12/13/1988	0	0	\$170	\$1,701	High wind
1/30/1989	0	0	\$194,700	\$1,947	Wind
1/31/1989	0	0	\$29,500	\$295	Blizzard
2/1/1989	0	1	\$170,789	\$171	Severe cold
4/5/1989	0	0	\$16	\$0	High wind
4/21/1989	0	0	\$97	\$0	Thunderstorm wind, funnel
4/28/1989	0	0	\$250	\$0	Winter storm
5/28/1989	0	0	\$3,894	\$0	Winter storm
11/12/1989	0	0	\$1,622	\$0	Heavy snow
11/20/1989	0	0	\$162	\$0	High wind
11/26/1989	0	0	\$46	\$0	Heavy snow
12/3/1989	0	0	\$16	\$0	High winds
1/25/1990	0	0	\$15,393	\$15,393	High wind
1/31/1990	0	0	\$9,236	\$0	Winter snow
2/11/1990	0	0	\$1,539	\$15,393	High winds
3/11/1990	0	0	\$15	\$0	Heavy snow
3/13/1990	0	0	\$201	\$0	Winter storm
4/28/1990	0	0	\$2,886	\$0	Winter storm

Table 4.4-8. Cascade County Severe Winter Weather Events with Damages

Date	Injuries	Fatalities	Property Damage (2016 \$)	Crop Damage (2016 \$)	Remarks
6/13/1990	0	0	\$92	\$0	Heavy snow
11/9/1990	0	0	\$154	\$0	High winds
11/22/1990	0	0	\$24,962	\$0	High winds
11/25/1990	0	0	\$1,539	\$0	Winter storm
11/30/1990	0	0	\$153,933	\$0	Ground blizzard, high winds
12/3/1990	0	0	\$1,539	\$0	High winds
12/4/1990	0	0	\$15	\$0	High winds
1/29/1991	0	0	\$148	\$0	High wind
2/28/1991	0	1	\$5,539	\$0	Blizzard, wind, snow
3/17/1991	0	0	\$68	\$0	Heavy snow
1/15/1992	0	0	\$1,434	\$0	High winds
1/24/1992	0	0	\$3	\$0	High winds
4/30/1992	0	0	\$1,434	\$0	High winds
8/23/1992	0	0	\$374	\$37,409	Winter storm
8/25/1992	0	0	\$0	\$1,509	Frost/freeze
9/26/1992	0	0	\$1,434	\$0	High winds
12/24/1992	0	0	\$7,822	\$0	High winds
1/15/1993	0	0	\$139	\$0	High winds
1/22/1993	0	0	\$49	\$0	Heavy snow
2/27/1993	0	0	\$1,392	\$0	Ground blizzard
2/24/1994	0	0	\$14,290	\$0	Winter storm
3/21/1994	0	0	\$1,358	\$13,576	High winds, dust storm
12/17/1998	0	0	\$7,406	\$0	High wind
12/16/1999	0	0	\$34,780	\$0	High wind
1/16/2000	0	0	\$42,061	\$0	Thunderstorm wind
1/12/2002	4	2	\$0	\$0	Wind
4/27/2003	0	0	\$26,840	\$0	Wind
11/13/2006	0	0	\$299	\$0	High wind
11/15/2006	0	0	\$8,554	\$0	High wind
1/2/2007	0	0	\$50,942	\$0	High wind
4/29/2008	0	0	\$3,364	\$0	Thunderstorm wind
TOTAL	5.79	5.24	\$1,127,449	\$88,253	

Source: SHELDDUS, 2016 (adjusted to 2016 dollars). Note: Often casualties and damage information are listed without sufficient spatial reference. In order to assign the damage amount to a specific county, the fatalities, injuries and dollar losses were divided by the number of counties affected from this event.

Snow generally does not cause the communities to shut down or disrupt activities. Occasionally though, extreme winter weather conditions can cause problems. The most common incident in these conditions are motor vehicle accidents due to poor road conditions. Such incidents normally involve passenger vehicles; however, an incident involving a commercial vehicle transporting hazardous materials or a vulnerable population such as a school bus is also possible.

Sheltering of community members could present significant logistical problems when maintained over a period of more than a day. Transportation, communication, energy (electric, natural gas, and vehicle fuels), shelter supplies, medical care, food availability and preparation, and sanitation issues all become exceedingly difficult to manage in extreme weather conditions. Local government resources could be quickly overwhelmed. Mutual aid and state aid might be hard to receive due to the regional impact of this kind of event.

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The American Red Cross has a presence in Cascade County and has the capacity to provide care for the duration of a severe weather event if need be through pre-determined sheltering agreements in accordance with national standards.

Windstorms and microbursts affect areas with significant tree stands, as well as areas with exposed property, major infrastructure, and aboveground utility lines. Severe hailstorms can also cause considerable damage to buildings and automobiles, but rarely result in loss of life. Nationally, hailstorms cause nearly \$1 billion in property and crop damage annually, as peak activity coincides with peak agricultural seasons. **Table 4.4-9** presents severe summer weather events in Cascade County with reported damages since 1960.

Table 4.4-9. Cascade County Severe Summer Weather Events with Damages

Date	Injuries	Fatalities	Property Damage (2016 \$)	Crop Damage (2016 \$)	Remarks
6/19/1960	0	0	\$408	\$0	Thunder and hailstorm
5/10/1961	0	0	\$1,682	\$0	High winds and thunderstorms
5/30/1961	0	0	\$859	\$8,590	Thunder, heavy rain, and hail
6/29/1961	0	0	\$4,896	\$8,590	Thunder, high wind, tornado
7/6/1961	0	0	\$0	\$40,373	Thunderstorm, heavy rain, hail
9/14/1963	2	0	\$0	\$0	High wind
6/6/1964	0	1.2	\$0	\$0	Heavy rain
7/2/1964	0	0	\$0	\$1,622	Hail, thunderstorms
7/4/1964	2	0	\$0	\$0	Lightning
8/18/1964	0	0	\$0	\$1,622	Lightning
6/24/1965	0	0		\$0	Thunderstorm and Hail
7/29/1965	0	0	\$0	\$38,322	Hail and wind
7/2/1966	0	0	\$12,419	\$1,241,914	Thunderstorms and hail
7/3/1967	0	0	\$361	\$3,614	Hail and Rain
7/17/1968	0	0	\$347	\$346,879	Hail, rain
7/19/1968	0	0	\$1,196	\$0	High wind, thunderstorms
8/4/1968	0	1	\$0	\$0	Wind
6/27/1970	0	0	\$66,195	\$66,195	Strong winds, hail
9/19/1971	0	0	\$1,753	\$0	Wind
10/11/1971	0	0	\$3,312	\$0	Wind
6/30/1973	0	0	\$82	\$824	Hail and strong winds
6/19/1974	0	0	\$30,607	\$30,607	Hailstorm
7/26/1974	0	0	\$816	\$0	High winds
7/1/1975	0	0	\$18,698	\$18,698	Wind, hail
7/15/1975	0	0	\$22,438	\$0	Wind
8/7/1975	0	0	\$467	\$4,675	Hail and wind
6/3/1976	0	0	\$21,215	\$21,215	Hail, wind
6/6/1976	0	0	\$10,608	\$1,060,756	Hail
6/10/1976	0	0	\$106,076	\$106,076	Hail
6/1/1977	0	0	\$199,198	\$0	Tornado
6/16/1977	0	0	\$166	\$16,600	Hail
7/3/1978	2	0	\$185,144	\$185,144	Tornado
8/22/1978	0	0	\$46,286	\$462,860	Hail, wind
6/25/1980	0	0	\$146,498	\$0	Wind
5/21/1981	0	0	\$885,325	\$0	Heavy rains
7/11/1981	0	0	\$0	\$442,662	Hail, winds
8/19/1981	0	0	\$132,799	\$0	Wind

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Table 4.4-9. Cascade County Severe Summer Weather Events with Damages

Date	Injuries	Fatalities	Property Damage (2016 \$)	Crop Damage (2016 \$)	Remarks
6/28/1982	0	0	\$125,092	\$1,250,922	Hail/rain
8/10/1983	0	0	\$12,120	\$121	Wind
5/25/1985	0	0	\$1,122	\$112,188	Hail
6/20/1985	0.02	0	\$2,609	\$2,609	Hail/wind
5/12/1987	0.2	0.2	\$21	\$21	High wind
6/17/1988	0	0	\$1,020	\$0	Thunderstorm wind
7/3/1988	0	0	\$102	\$0	Thunderstorm winds
7/5/1988	0	0	\$10,204	\$0	Tornado (f1), hail
9/17/1988	0	0	\$51,020	\$0	Severe storm-snow
5/10/1989	0	0	\$97	\$0	Thunderstorm winds
5/23/1989	0	0	\$1,622	\$0	High winds
7/15/1989	0	0	\$974	\$974	Thunderstorm wind
7/20/1989	0	0	\$974	\$974	Thunderstorm wind
7/31/1989	0	0	\$97	\$0	Lightning
10/10/1989	0	0	\$74	\$0	High winds
7/2/1990	1	0	\$9,245,196	\$1,015,956	Hail, thunderstorm winds
7/5/1990	0	0	\$9,236	\$9,236	Thunderstorm wind
7/13/1990	0	0	\$924	\$0	Lightning
10/16/1991	0	0	\$180,877	\$0	Wind
8/2/1992	0	0	\$860	\$86,040	Hail
5/27/1994	0	0	\$81,453	\$0	Thunderstorm winds
6/26/1994	0	0	\$6,788	\$0	High winds
6/15/1996	0	0	\$2,370	\$0	Hail
7/3/1998	0	0	\$41,472	\$0	Tornado
7/10/1998	0	0	\$7,406	\$0	Thunderstorm wind /hail
9/19/1998	0	0	\$1,481	\$0	Thunderstorm wind
10/31/1999	0	0	\$144,915	\$0	High wind
6/15/2003	0	0	\$0	\$1,312	Hail
6/19/2003	0	0	\$78,727	\$0	Severe storm/thunderstorm wind
8/8/2003	0	0	\$6,561	\$0	Severe storm/thunderstorm wind
6/6/2004	0	0	\$2,556	\$0	Hail
6/29/2004	1	0	\$12,781	\$0	Lightning
8/4/2004	1	0	\$0	\$0	Hail
TOTAL	9.22	2.4	\$11,930,603	\$6,588,191	

Source: SHELDDUS, 2016 (adjusted to 2016 dollars).

Annual loss was computed for the severe summer and winter weather hazard in Cascade County using SHELDDUS data and the formula: Frequency x Magnitude x Exposure = Annual Loss, as further explained in *Section 4.1.6*. **Table 4.4-10** presents the results of the calculations.

Table 4.4-10. Cascade County Severe Weather Annual Loss

No. of Events	Period of Record (Yrs)	Frequency	Damage	Magnitude	Exposure	Annual Loss
Severe Summer Weather						
70	56	1.25	\$18,518,794	0.00293%	\$9,016,974,972	\$330,693
Severe Winter Weather						
89	55	1.62	\$1,215,702	0.00015%	\$9,016,974,972	\$22,129

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The National Drought Mitigation Center tracks indemnity payments for losses suffered due to drought on a county basis. **Table 4.4-11** presents drought damages for a 25 year period (1989 to 2014) for Cascade County and the State of Montana.

Table 4.4-11. Drought Insurance Claims; Cascade County 1989 - 2014

Year	Montana	Cascade Co.	Year	Montana	Cascade Co.	Year	Montana	Cascade Co.
1989	\$14,361,948	\$8,887	1998	\$18,201,060	\$847,255	2007	\$22,015,676	\$133,687
1990	\$29,146,575	\$51,752	1999	\$19,189,328	\$1,167,417	2008	\$74,979,811	\$394,037
1991	\$2,775,746	\$166,478	2000	\$44,989,149	\$2,341,370	2009	\$30,435,526	\$682,224
1992	\$37,767,835	\$2,117,438	2001	\$131,976,513	\$5,911,633	2010	\$5,289,266	\$0
1993	\$344,432	\$0	2002	\$108,139,519	\$3,545,118	2011	\$52,075,321	\$35,995
1994	\$5,539,598	\$367,452	2003	\$41,148,170	\$2,359,867	2012	\$10,055,101	\$2,683,806
1995	\$2,413,758	\$379,512	2004	\$29,427,194	\$788,425	2011	\$11,670,134	\$480,870
1996	\$10,637,521	\$881,542	2005	\$5,905,724	\$90,566	2014	\$5,289,266	\$241,308
1997	\$3,830,310	\$16,389	2006	\$41,483,327	\$180,381	TOTAL	\$759,087,808	\$25,873,409

Source: National Drought Mitigation Center, 2016;

<http://drought.unl.edu/Planning/Impacts/DroughtIndemnityData.aspx>

The NOAA's Paleoclimatology Program has studied drought by analyzing records from tree rings, lake and dune sediments, archaeological remains, historical documents, and other environmental indicators to obtain a broader picture of the frequency of droughts in the United States. According to their research, "...paleoclimatic data suggest that droughts as severe as the 1950's drought have occurred in central North America several times a century over the past 300-400 years, and thus we should expect (and plan for) similar droughts in the future. The paleoclimatic record also indicates that droughts of a much greater duration than any in the 20th century have occurred in parts of North America as recently as 500 years ago." Based on this research, the 1950's drought situation could be expected approximately once every 50 years or a 20 percent chance every 10 years. An extreme drought, worse than the 1930's "Dust Bowl" has an approximate probability of occurring once every 500 years or a 2 percent chance of occurring each decade (NOAA, 2004).

Severe weather occurs in Cascade County multiple times each year. Therefore, the probability of a severe storm in either the winter or summer is rated as "highly likely". Based on historic conditions, the probability of future drought events in Cascade County are ranked as "likely", occurring more than once every 10 years but not every year.

Future Development

The State of Montana has adopted the 2012 International Building Codes (IBC) which include a provision that buildings must be constructed to withstand a wind load of 75 mph constant velocity and three second gusts of 90 mph and must be designed to withstand a snow load of 30 pounds per square foot minimum. The IBC does not cover single-family residences.

The State of Montana has adopted the 2012 International Residential Code (IRC) for one and two family residences and townhouses. Local jurisdictions (cities, counties and towns) can elect to become certified to take on enforcement of single-family residences. The City of Great Falls is certified to enforce building codes. Cascade County and the Towns of Belt, Cascade and Neihart do not have building departments and therefore, have no enforcement capabilities to ensure State building codes are followed.

Drought could have an effect on future development with regards to groundwater availability. New domestic water wells and sewer systems could use up more of the groundwater resource, particularly during periods of drought.

Climate Change

Climate change presents a challenge for risk management associated with severe weather and drought. The frequency of severe weather events has increased steadily over the last century. The number of weather-related disasters during the 1990s was four times that of the 1950s, and cost 14 times as much in economic losses. Historical data shows that the probability for severe weather events increases in a warmer climate.

With a warmer climate, droughts could become more frequent, more severe, and longer-lasting. According to the National Climate Assessment, “higher surface temperatures brought about by global warming increase the potential for drought. Evaporation and the higher rate at which plants lose moisture through their leaves both increase with temperature. Unless higher evapotranspiration rates are matched by increases in precipitation, environments will tend to dry, promoting drought conditions (www.globalchange.gov, 2016).

Population exposure and vulnerability to severe weather and drought are likely to increase as a result of climate change. Severe weather events may occur more frequently which would lead to increased exposure and vulnerability. Although all people may be affected by the health-related impacts of climate change, the elderly, young children, and people with weakened immune systems are often the most susceptible. Indirect influences of climate change may create conditions that are more favorable to disease vectors. Some people without access to backup water supplies, may suffer water shortages during severe droughts. A greater number of people may need to engage in behavior change, such as water conservation.

Property exposure and vulnerability may increase as a result of increased severe weather and drought resulting from climate change. Increased structure damage from high winds and hail could result as well as damage to crops and landscaping. Secondary impacts, such as wildfire, may increase and threaten structures.

The effects of climate change can harm agricultural activities, both crops and livestock. The changes in temperature and precipitation brought on by climate change can make it harder to grow some crops. Intense rains can increase runoff and deprive plants of nutrient-rich topsoil and changes in temperatures may cause crops to mature earlier, which can expose them to harsh weather. Warmer temperatures can introduce new agricultural pests to the region or make conditions better for pests already present, including weeds and invasive plants that can crowd out crops. Maintaining agricultural activities on marginal lands may no longer be sustainable (FEMA, 2016).

Changes to the frequency, severity, and affected area of climate-related hazards may have economic consequences. Potential decreases in agricultural outputs may affect the economy in farming and ranching areas. Communities that rely on tourism may see a decrease in visitors due to severe weather, and areas that are popular sites for water recreation can be negatively affected by droughts. If these economic effects become widespread, the impacts could be felt at a statewide or regional level (FEMA, 2016).

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Critical facility exposure and vulnerability would be unlikely to increase as a result of climate change impacts to the severe weather and drought; however, critical facility owners and operators may experience more frequent disruption to the services they provide. For example, extreme heat can decrease the effectiveness of electrical equipment, including power lines, which can lead to blackouts during very hot conditions. An increase in requests for medical assistance during a heat wave may challenge emergency response capabilities. In addition, critical facility operators may need to alter standard management practices and actively manage resources, particularly in water-related service sectors.

4.5 Communicable Disease

CPRI SCORE = 3.7

Description and History

Communicable diseases, sometimes called infectious diseases, are illnesses caused by organisms such as bacteria, viruses, fungi and parasites. Sometimes the illness is not due to the organism itself, but rather a toxin that the organism produces after it has been introduced into a human host. Communicable disease may be transmitted (spread) either by: one infected person to another, from an animal to a human, from an animal to an animal, or from some inanimate object (doorknobs, table tops, etc.) to an individual. A pandemic is a global disease outbreak. Human diseases, particularly epidemics, are possible throughout the nation and Cascade County is not immune to this hazard. In addition, livestock and animal disease could have a devastating effect on the economy and food supply in Cascade County and beyond. Highly contagious diseases are the most threatening to both populations.

Communicable disease or biological agents could be devastating to the population or economy of Cascade County. Human diseases when on an epidemic scale, can lead to high infection rates in the population causing isolation, quarantines and potential mass fatalities. Diseases that have been eliminated from the U.S. population, such as smallpox, could be used in bioterrorism.

The following list gives examples of biological agents or diseases that could occur naturally or be used by terrorists as identified by the Centers for Disease Control and Prevention (2011).

Category A

Definition - The U.S. public health system and primary healthcare providers must be prepared to address various biological agents, including pathogens that are rarely seen in the United States. High-priority agents include organisms that pose a risk to national security because they:

- Can be easily disseminated or transmitted from person to person;
- Result in high mortality rates and have the potential for major public health impact;
- Might cause public panic and social disruption; and
- Require special action for public health preparedness.

Agents/Diseases:

- Anthrax (*Bacillus anthracis*)
- Botulism (*Clostridium botulinum* toxin)
- Plague (*Yersinia pestis*)
- Smallpox (*variola major*)
- Tularemia (*Francisella tularensis*)
- Viral hemorrhagic fevers (filoviruses [e.g., Ebola, Marburg] and arenaviruses [e.g., Lassa, Machupo])

Category B

Definition - Second highest priority agents include those that:

- Are moderately easy to disseminate;
- Result in moderate morbidity rates and low mortality rates; and
- Require specific enhancements of CDC's diagnostic capacity and enhanced disease surveillance.

Agents/Diseases:

- Brucellosis (*Brucella* species)
- Epsilon toxin of *Clostridium perfringens*
- Food safety threats (e.g., *Salmonella* species, *Escherichia coli* O157:H7, *Shigella*)
- Glanders (*Burkholderia mallei*)
- Melioidosis (*Burkholderia pseudomallei*)
- Psittacosis (*Chlamydia psittaci*)
- Q fever (*Coxiella burnetii*)
- Ricin toxin from *Ricinus communis* (castor beans)
- Staphylococcal enterotoxin B
- Typhus fever (*Rickettsia prowazekii*)
- Viral encephalitis (alphaviruses [e.g., Venezuelan equine encephalitis, eastern equine encephalitis, western equine encephalitis])
- Water safety threats (e.g., *Vibrio cholerae*, *Cryptosporidium parvum*)

Category C

Definition - Third highest priority agents include emerging pathogens that could be engineered for mass dissemination in the future because of:

- Availability;
- Ease of production and dissemination; and
- Potential for high morbidity and mortality rates and major health impact.

Agents:

- Emerging infectious diseases such as Nipah virus and hantavirus

These diseases/bioterrorism agents can infect populations rapidly, particularly through groups of people in close proximity such as schools, assisted living facilities, and workplaces.

Historically, the Spanish influenza outbreak after World War I in 1918-1919 caused 9.9 deaths per 1,000 people in the State of Montana (Brainerd and Siegler, 2002). Historical records from newspapers show that the influenza outbreak was so bad in 1918 that residents were quarantined from November 30 to December 17 after 18 people died and 53 new cases were discovered.

Influenza is a highly contagious viral infection of the nose, throat, and lungs that occurs most often in the late fall, winter, and early spring. It is a serious infection that affects between 5-20 percent of the U.S. population annually. Each year, more than 200,000 individuals are hospitalized and 3,000-49,000 deaths occur from influenza-related complications (IDSA, 2016). The Montana Department of Public Health and Human Services (DPHHS), maintains statistics of influenza cases in Montana counties. Recent data for Cascade County is summarized below:

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- 2012-2013 season: 1,514 influenza cases in the County with 15 fatalities across the State.
- 2013-2014 season: 309 influenza cases in the County with 8 fatalities across the State.
- 2014-2015 season: 386 influenza cases in the County with 33 fatalities across the State.
- 2015-2016 season: 374 influenza cases in the County with 24 fatalities across the State.

Norovirus is the leading cause of illness and outbreaks from contaminated food in the United States. Most outbreaks happen when infected people spread the virus to others. Health care facilities, including nursing homes and hospitals, are the most commonly reported settings for norovirus outbreaks.

The Montana Department of Public Health and Human Services manages a database of reportable communicable disease occurrences. The communicable disease summary for Cascade County between 2006 and 2015 is presented in **Table 4.5-1**.

Table 4.5-1. Ravalli County Communicable Disease Summary; 2006 - 2015

Disease	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Vaccine Preventable Diseases										
Hepatitis B, acute	1	-	1	-	-	-	-	-	-	-
Hepatitis C, acute	-	-	-	-	-	1	-	2	-	-
Legionella	-	1	1	-	2	-	-	2	2	3
Meningitis	2	1	1	-	2	-	1	-	-	-
Meningococcal	-	-	-	2	-	-	-	-	-	-
Pertussis	-	12	6	1	-	-	19	3	30	46
Strep Pneumonia	-	1	-	-	-	1	-	-	2	1
Tuberculosis	1	1	2	-	-	-	-	-	1	2
Varicella	-	2	15	2	9	3	3	1	5	1
Enteric Diseases										
Amebiasis	1	-	1	1	-	-	1	-	-	-
Campylobacter	9	12	4	11	7	13	15	16	23	24
Cryptosporidiosis	12	6	2	-	1	11	15	18	6	1
E Coli	-	-	-	-	-	4	3	3	2	7
Giardia	-	4	13	2	6	5	2	11	12	4
Salmonella	6	8	16	9	5	14	4	12	12	14
Shigella	-	-	-	-	-	5	-	1	32	3
Other Communicable Diseases										
Hantavirus	-	-	-	-	-	-	2	-	-	-
Rabies	1	1	1	1	2	-	3	-	-	1
STD	357	379	363	265	376	413	420	446	476	489
Tick Fever, Lyme	-	1	1	-	2	-	2	1	-	1
West Nile Virus	8	11	1	-	-	-	-	1	-	1

Source: Montana DPHHS Communicable Disease Summaries, 2006 – 2015

Notes: STD = Sexually Transmitted Disease

According to the Montana Department of Livestock, known livestock and animal diseases such as Foot and Mouth, Bovine Spongiform Encephalopathy (Mad Cow Disease), Exotic Newcastle, Rabies, Scabies, and Brucellosis could have damaging effects on the livestock population. Losses from these diseases would be devastating and could have an economic effect county-wide.

Vulnerability and Area of Impact

Diseases threaten the population, plants, and animals of Cascade County as opposed to structures. The entire population is at risk for contracting disease. The more urban nature of Great Falls makes it more vulnerable to rapidly spreading and highly contagious diseases than other more rural parts of the County. In addition, tourist visits in the county could introduce a disease to the local population. The number of fatalities in the county would depend on the mortality (disease/agent attack) rate and the percentage of the population affected. The ability to control the spread of disease will be dependent on the contagiousness of the disease and movement of the population. Given the uncertain nature of diseases, Cascade County is assumed to have the same communicable disease risk county-wide.

Probability and Magnitude

The probability of an epidemic in Cascade County is difficult to assess based on history and current data. Individual infectious diseases will likely be reported on an annual basis giving this hazard a probability rating of “highly likely”. The MHMP Planning Team rated the probability as “highly likely” that a global communicable disease outbreak would impact Cascade County.

The magnitude of a communicable disease outbreak varies from common viral outbreaks to widespread bacterial infection. During the 1918 influenza pandemic, infection rates approached 28 percent in the United States (Billings, 1997). Other pandemics produced infection rates as high as 35 percent of the total population (World Health Organization (WHO), 2009). Such a pandemic affecting Cascade County represents a severe magnitude event. Almost any communicable disease that enters the regional population could overwhelm local health resources as would any rapidly spreading bioterrorism event for which there is no available vaccine or containment capability.

While the U.S. saw an Ebola outbreak in 2014, news of an Ebola virus for the state of Montana was minimal. Montana DPHHS said the likelihood of Ebola showing up in Montana is small.

Montana’s local and state public health officials are monitoring developments regarding Zika virus closely. At this time, the impact of Zika in Montana will likely be confined to individuals returning from or planning travel to Zika-affected areas and Montana’s mosquitoes are not expected to be able to transmit the virus.

Future Development

There are no land use regulations for future development that could impact the communicable disease hazard. New residents and population add to the number of people threatened in the county, but the location of such population increases would not increase their vulnerability to the hazard.

Climate Change

Many prevalent human infections are climate sensitive. In some cases, this is in part because the disease is transmitted by mosquitoes which cannot survive if temperatures are too low. For others, climate restricts where an infection can occur because it limits the distribution of other species that are required for disease transmission.

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Although some evidence indicates that warming may be causing infectious disease to spread, predicting how climate change will ultimately influence the incidence of diseases transmitted by insects remains challenging. More predictable as climate change unfolds is the spread of so-called waterborne infections. These infections most often cause diarrheal illness and flourish in the wake of heavy rainfalls as runoff from land enters into and may contaminate water supplies. Many pathogens that cause diarrheal disease reproduce more quickly in warmer conditions as well (Harvard School of Public Health, 2016).

The effects of climate change on the communicable disease hazard are mainly to the population. Outbreaks of insect- and water-borne infection associated with higher temperatures and/or flooding could increase population exposure; especially vulnerable would be the young and elderly. Property and critical facilities are not expected to have an increase in exposure or vulnerability due to the effects of climate change on communicable disease.

4.6 Transportation Accidents

CPRI SCORES:
AIRCRAFT ACCIDENTS = 3.15
HIGHWAY ACCIDENTS = 3.5
RAILROAD ACCIDENTS = 3.7

Description and History

The source and location of transportation accidents vary but the response is typically the same. Response is focused on determining the presence of hazardous materials and then assisting the injured. This Transportation Accident hazard profile covers highway accidents, railroad accidents, and aircraft accidents. *Section 4.2* presents the hazard profile for Hazardous Material Incidents.

Highway Accidents

According to the Cascade County Growth Policy, approximately 104,000 passenger automobiles and trucks are registered in the county. These travel on approximately 1,700 miles of county-maintained roads, which are the secondary highways and light-duty roads, and approximately 375 miles of state-maintained highways, which are primary highways including Interstate 15 and its frontage roads. Approximately 30 interstate carriers serve Great Falls providing a wide spectrum of service to and from everywhere in the United States and Canada. Below is a summary of the main transportation routes through Cascade County.

- Interstate 15 — a north-south transcontinental highway that extends from the Canadian border near Sweetgrass, MT to San Diego, CA. This roadway traverses Cascade, Lewis and Clark, and Teton Counties while connecting Great Falls to Helena.
- U.S. Highway 87 — a primary north-south highway that extends from Havre, MT to Port Lavaca, TX. US Highway 87 travels through Cascade, Chouteau, Fergus, and Judith Basin Counties connecting Great Falls to Fort Benton, Lewistown, and other smaller communities in these counties.
- U.S. Highway 89 — a north-south highway that stretches from the Canadian border near Babb, MT through the northern entrance of Yellowstone National Park and eventually the southern entrance of Yellowstone to Flagstaff, AZ. This route extends through Cascade, Lewis and Clark, and Teton Counties connecting Great Falls to Choteau.
- U.S. Highway 287 — a north-south highway that extends from Choteau, MT to Port Austin, TX. This highway travels through Lewis and Clark and Teton Counties connecting Helena to Choteau.
- Montana Highway 3 — a north-south highway that stretches from Great Falls to Billings. This route traverses Cascade, Fergus, Judith Basin, and Wheatland Counties connecting Great Falls to Harlowton in Wheatland County and several other communities.
- Montana Highway 80 — a north-south highway that runs from Fort Benton to Stanford. This route lies in Chouteau, Fergus, and Judith Basin Counties connecting Fort Benton to Stanford.
- Montana Highway 200 — an east-west highway that stretches from Fairview, MT to Heron, MT. This highway travels through Cascade, Fergus, Judith Basin, and Lewis and Clark Counties connecting Great Falls to several smaller communities throughout the region.

Vehicular accidents occur for a number of reasons including distracted drivers, driver fatigue, drunk driving, speeding, aggressive driving, and weather. In Montana vehicle collisions with wildlife are a common occurrence. Statistics on highway accidents in Cascade County over the past 10 years are presented in **Table 4.6-1**. There is no history of a mass casualty accident in Cascade County involving

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a school bus or tour bus; however, school events use bus transport during winter months when severe weather can pose an extreme risk.

Approximately 104,000 passenger automobiles and trucks are registered in the county. These travel on approximately 1,700 miles of County maintained roads, which are the secondary highways and light-duty roads, and approximately 375 miles of State maintained highways.

Table 4.6-1. Cascade County Vehicular Crash Data; 2006 – 2015

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	TOTAL
All Crashes											
Fatal Crash	9	11	7	5	5	8	7	10	15	9	86
Serious Injury Crash	49	62	46	44	37	27	39	38	25	25	392
Total # of Crashes	2,098	2,182	2,255	2,252	2,326	2,150	2,012	1,993	2,030	2,098	21,396
Nighttime Crashes											
Fatal Crash	4	4	4	3	2	5	4	5	8	4	43
Serious Injury Crash	18	17	19	15	16	7	12	10	12	8	134
Total # of Crashes	557	603	655	604	627	489	579	552	510	540	5,716
Rural Roadway Crashes											
Fatal Crash	8	9	5	4	4	5	6	9	14	7	71
Serious Injury Crash	31	35	30	22	21	16	22	19	19	19	234
Total # of Crashes	442	482	523	460	452	442	470	427	393	445	4,536
Winter Crashes											
Fatal Crash	3	1	4	0	0	1	0	6	2	2	19
Serious Injury Crash	17	12	16	17	9	7	6	14	1	7	106
Total # of Crashes	710	832	904	804	979	870	731	758	839	815	8,242
Wild Animal Involved Crashes											
Fatal Crash	0	0	0	0	0	0	0	0	0	0	0
Serious Injury Crash	2	4	2	3	1	1	0	0	2	2	17
Total # of Crashes	118	144	132	137	147	112	151	92	91	121	1,245

Source: MDT, 2017 (<http://www.mdt.mt.gov/publications/datastats/crashdata.shtml>); Notes “-” = Data Not Available

Railroad Accidents

The Burlington Northern-Santa Fe (BNSF) Railway Company provides freight service to Cascade County. BNSF's rails extend northwest from Laurel to Shelby. BNSF also maintains tracks from Great Falls to Choteau. Rail service accounts for the second-highest volume of freight movement behind trucks. Agricultural products and supplies account for most of the freight shipped from the area. A large percentage of the large, bulk incoming manufactured products and lumber are moved by rail as well. East-west service follows U.S. Highway 2 along the Hi-line. Since the 1972 merger of the Great Northern, Northern Pacific and Chicago, Burlington and Quincy lines, Great Falls is no longer on the mainline between the south, the Midwest and the west coast.

There are about a dozen at-grade railroad crossings in the area. Most of the principal and minor arterials have bridges to cross over or under the rail lines so there are few safety hazards, delays, or other conflicts between the trains and motor vehicles. The frequency and length of trains using the at-grade crossings have not historically caused significant delays, hazards or other problems for drivers. **Table 4.6-2** lists railroad accidents in Cascade County with details on which of those involved hazardous materials.

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Table 4.6-2. Cascade County Railroad Accidents; 1990 – 2016

Date	Nearest Town	Injuries	Fatalities	Cars Carrying Haz-Mat	Haz-Mat Cars Damaged	Comments
8/18/1990	Great Falls	0	0	2	2	Derailed 4 cars. No hazardous materials released.
3/17/1991	Great Falls	0	0	0	0	Derailed 15 cars
10/10/1991	Great Falls	0	0	0	0	Derailed 8 cars
1/31/1993	Great Falls	0	0	0	0	Other
4/23/1993	Vaughn	0	0	12	6	Derailed 6 cars. 1 car releasing hazardous materials. 30 people evacuated.
10/16/1993	Great Falls	0	0	0	0	Derailed 5 cars
11/12/1993	Great Falls	0	0	0	0	Derailed 12 cars
6/12/1994	Great Falls	0	0	0	0	Derailed 1 car
9/13/1994	Great Falls	0	0	4	0	Derailed 5 cars. No hazardous materials released.
10/6/1995	Cascade	0	0	8	0	Derailed 2 cars, No hazardous materials released.
2/8/1996	Great Falls	0	0	0	0	Derailed 9 cars
4/3/1996	Great Falls	0	0	0	0	Derailed 8 cars
4/18/1996	Great Falls	0	0	0	0	Derailed 3 cars
5/23/1996	Great Falls	0	0	0	0	Derailed 5 cars
5/27/1996	Great Falls	0	0	3	0	Derailed 3 cars. No hazardous materials released.
11/10/1996	Great Falls	0	0	0	0	Derailed 24 cars
8/20/1997	Great Falls	0	0	1	1	Derailed 4 cars. No hazardous materials released.
9/24/1997	Great Falls	0	0	0	0	Derailed 3 cars
1/4/1998	Great Falls	0	0	0	0	Other
8/4/1998	Great Falls	0	0	0	0	Derailed 10 cars
11/27/2000	Great Falls	0	0	10	0	Derailed 2 cars. No hazardous materials released.
3/3/2001	Great Falls	0	0	0	0	Derailed 8 cars
4/12/2003	Great Falls	0	0	0	0	Derailed 9 cars
12/28/2003	Great Falls	0	0	1	1	Derailed 3 cars. No hazardous materials released.
8/3/2004	Great Falls	0	0	13	6	0 cars derailed. No hazardous materials released.
5/1/2005	Great Falls	0	0	1	1	Derailed 6 cars. No hazardous materials released.
3/2/2006	Great Falls	0	0	0	0	Derailed 1 car
10/20/2006	Great Falls	0	0	0	0	Derailed 3 cars
11/10/2006	Great Falls	0	0	11	0	Derailed 2 cars. No hazardous materials released.
1/23/2007	Great Falls	0	0	4	4	Derailed 6 cars. No hazardous materials released.
10/15/2007	Great Falls	0	0	6	0	0 cars derailed. No hazardous materials released.
1/25/2008	Great Falls	0	0	10	2	Collision. No hazardous materials released.
4/22/2008	Great Falls	0	0	0	0	Other; 0 cars derailed
9/16/2008	Great Falls	0	0	0	0	Derailed 9 cars
3/28/2010	Great Falls	0	0	15	0	Derailed 2 cars. No hazardous materials released.
6/22/2010	Great Falls	0	0	0	0	Derailed 1 car
10/14/2010	Great Falls	0	0	0	0	Derailed 14 cars
3/21/2011	Great Falls	0	0	0	0	Derailed 5 cars
5/13/2011	Great Falls	0	0	0	0	Other
7/19/2011	Great Falls	2	0	0	0	Collision. 3 locos & 15 cars derailed
11/27/2011	Great Falls	0	0	0	0	Derailed 4 cars
10/7/2012	Great Falls	0	0	16	7	Derailed 12 cars. No hazardous materials released.
11/25/2012	Great Falls	0	0	0	0	Derailed 2 cars
6/16/2013	Great Falls	0	0	1	1	5 cars derailed. No hazardous materials released.
9/27/2013	Great Falls	1	1	0	0	Highway/Rail crossing.
12/11/2013	Great Falls	0	0	0	0	Derailed 1 car
1/8/2014	Great Falls	0	0	0	0	Derailed 8 cars
1/22/2014	Great Falls	0	0	2	2	Derailed 2 cars. No hazardous materials released.

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Table 4.6-2. Cascade County Railroad Accidents; 1990 – 2016

Date	Nearest Town	Injuries	Fatalities	Cars Carrying Haz-Mat	Haz-Mat Cars Damaged	Comments
2/27/2014	Great Falls	0	0	22	2	Derailed 8 cars. No hazardous materials released.
12/29/2014	Great Falls	0	0	11	2	Derailed 4 cars. No hazardous materials released.
2/16/2015	Great Falls	0	0	0	0	Derailed 5 cars
7/8/2015	Great Falls	0	0	0	0	Derailment; 1 car
11/24/15	Great Falls	0	0	5	5	Derailed 5 cars. No hazardous materials released.
4/13/16	Great Falls	0	0	0	0	Derailment; 1 car
6/21/16	Great Falls	0	0	0	0	Derailed 6 cars
TOTAL		3	1	158	42	

Source: Federal Railroad Administration, 2017; <http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/Query/incabbr.aspx>

The Federal Railroad Administration data indicates that between 1990 and 2016 there were 56 railroad accidents involving one fatality and 3 injuries. During this period, 21 accidents involved railcars carrying hazardous materials that were damaged. Further details on these incidents are presented under the *Hazardous Material Incident* hazard in *Section 4.2*.

Table 4.6-3 presents accidents at railroad crossings in the county. According to the National Transportation Safety Board (NTSB), 60 percent of all railroad accidents occur at unprotected or passive crossings.

Table 4.6-3. Cascade County Accidents at Railroad Crossings: 1990 – 2016

Date	Nearest RR Station	Road	Road Type	Fatalities	Injuries	Crossing Protection
4/21/1990	Gerber	Fisher	Public	0	0	Cross bucks
5/10/1992	Cascade	Pelican Point	Public	0	1	Stop signs
1/9/1993	Great Falls	Mill Line, GF	Public	0	0	Cross bucks
8/6/1993	Great Falls	Private-Lumber	Private	0	0	None
11/24/1993	Great Falls	Bay Drive, GF	Public	0	0	Cross bucks
1/7/1995	Great Falls	11th Street, GF	Public	0	0	Stop signs
5/23/1995	Great Falls	1st Avenue SW, GF	Public	0	0	Stop signs
2/4/1996	Great Falls	14th St North, GF	Public	0	0	Flashing lights
6/22/1996	Great Falls	Sand Coulee St, GF	Public	0	1	Flashing lights
1/11/1997	Great Falls	13th St. North, GF	Public	0	0	Cross bucks
6/11/1998	Great Falls	11th Street	Public	0	0	Cross bucks
11/15/1998	Gerber	FAS 227	Public	2	0	Flashing lights
7/9/1999	Great Falls	74 - 105, GF	Public	0	0	Cross bucks
2/14/2002	Great Falls	GF Wastewater	Public	0	0	Cross bucks
11/7/2003	Great Falls	Wagon Lane	Public	1	0	Cross bucks
12/9/2003	Great Falls	Bat Drive	Public	0	1	Cross bucks
2/3/2004	Great Falls	9th Avenue, GF	Public	0	0	Cross bucks
10/18/2005	Great Falls	9th Street N, GF	Public	0	0	Gates
12/27/2005	Gerber	Gibson Flats Rd	Public	0	1	Cross bucks
8/24/2008	Vaughn	Private Xing	Private	0	0	Stop signs
11/4/2009	Armington	Armington	Public	0	0	Cross bucks
9/27/2013	Great Falls	Gerber E 0.7 mi	Public	1	1	Flashing lights
1/20/2015	Vaughn	Vaughn	Public	1	0	Cross bucks
TOTAL				5	5	

Source: Federal Railroad Administration, 2017;
<http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/Query/gxrabbr.aspx>



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Federal Railroad Administration data indicates that from 1990 to 2016, there have been five fatalities and five injuries at railroad crossings in Cascade County. A description of two railroad accidents in Cascade are presented below.

November 1976 - On November 26, 1976, a Burlington Northern freight train derailed in the town of Belt. The 121 car BN freight train was approaching the Farmers Union fuel storage area when one of four railroad tankers containing propane derailed and then exploded as it struck the railroad viaduct over the road leading into Belt. A total of 24 cars in the middle of the train jumped the tracks and several careened into one of four 30,000 gallon liquid propane storage tanks at the Farms Union storage area. The derailment was followed by two major explosions. The initial blast hurled one railroad car 300 feet off the tracks and ignited several businesses and houses on one side of the viaduct and a lumber yard on the other side. Two hours later, another propane tanker exploded, rocking the entire community.

About half of the residents of Belt were evacuated by authorities as railroad tankers and storage tanks exploded sending huge fireballs into the sky and hurling burning debris onto houses on the far side of the community. At least six business buildings and six homes were destroyed by the fire which spread over more than four city blocks near the railroad tracks. About one-half of the town's houses had window damage and metal debris from exploding tanks damaged homes more than a mile away. The overpass was destroyed in the explosions. Two persons were killed. (Great Falls Tribune, November 27 and 28, 1976).

January 2015 – The single occupant of a pickup truck was killed in a collision with a BNSF train in the Vaughn area. The south-bound train pulling empty grain cars collided with the vehicle at the crossing at 266 Gordon Road which is north of Vaughn and south of Power. The crossing is marked with stationary railroad crossing signs. (Great Falls Tribune, *Fatal Collision between Train, Pickup near Vaughn*, January 20, 2015).

Aircraft Accidents

The area's public airport is the Great Falls International Airport. Privately owned aviation-related industries are also located on Airport property, as is the headquarters of the 120th Fighter Interceptor Group of the Montana Air National Guard. Express airmail services are provided by Federal Express, United Parcel Service, and the U. S. Postal Service with most local freight handled at the Great Falls International Airport. Northwest Airlines, Delta Airlines, Big Sky Airlines, and Horizon Airlines provide regularly scheduled commercial passenger services. Although the runways and aviation facilities located at Malmstrom Air Force Base are just beyond the city limits, these facilities are not available for public use. Heliports in Great Falls are located at the two hospital facilities and are reserved for emergency flights. (Cascade County Growth Policy, 2014)

Aviation accidents can occur for a multitude of reasons from mechanical failure to poor weather conditions to pilot error. They are often fatal to the occupants. Federal Aviation Administration (FAA) database listings for aircraft accidents in Cascade County are presented in **Table 4.6-4**.

Table 4.6-4. Cascade County Aircraft Accidents

Date	Location	Fatalities	Aircraft Type / Probable Cause
6/22/1980	Great Falls	0	PIPER PA-30; Pilot in command failed to assure the gear was down and locked
1/27/1981	Cascade	0	PIPER PA-18; Pilot in command failed to maintain directional control

Table 4.6-4. Cascade County Aircraft Accidents

Date	Location	Fatalities	Aircraft Type / Probable Cause
7/12/1981	Great Falls	0	CESSNA 182; Dual student - improper operation of flight controls
9/2/1981	Great Falls	0	AERO COMDR 681; Miscellaneous acts, conditions - material failure
1/6/1983	Great Falls	0	BELL 47G-3B-2; Maintenance inadequate
12/27/1983	Great Falls	0	LAKE LA-4-200; Lubricating system oil seal leak
5/14/1986	Great Falls	0	CESSNA 172H; Over compensation for wind conditions
12/2/1986	Great Falls	0	CESSNA 152A; Control tower service inadequate
12/6/1987	Great Falls	0	CESSNA 177RG; Preflight planning/preparation improper
4/26/1988	Great Falls	0	CESSNA 182P; Flare improper
8/7/1988	Cascade	0	CESSNA 180; In-flight planning/decision improper
3/25/1989	Great Falls	0	PIPER PA-18-150; Failure to compensate adequately for wind conditions
9/18/1989	Neihart	0	MOONEY M20C; Failure to maintain sufficient altitude.
11/14/1991	Belt	0	PIPER PA-24-250; Blocked fuel vent resulted in fuel starvation
5/19/1994	Great Falls	1	SPITFIRE MARK 18; Pilot's failure to maintain aircraft control
11/8/1994	Great Falls	4	BEECH 58P; Pilot's failure to maintain aircraft control
5/16/1997	Great Falls	0	LEARJET 35A; Pilot's inadequate preflight planning/preparation factor.
5/19/1998	Great Falls	2	PIPER PA-31T1; Flight crew's failure to maintain aircraft control
7/13/1998	Great Falls	0	PIPER PA-32-300; Improper remedial action and overload of the landing nose
11/17/1999	Neihart	0	BELL 206L-1; Clearance from object not maintained. Gusting wind conditions
11/12/2000	Great Falls	0	PIPER PA-20; Improper decision to land on snow covered terrain
7/21/2001	Great Falls	0	PILATUS PC-6/B2-H4; Failure to maintain directional control while landing
1/9/2002	Great Falls	0	CESSNA 210L; Failure to maintain clearance from terrain
8/17/2004	Neihart	2	BEECH BE-99; Pilot's failure to maintain adequate terrain clearance.
3/24/2005	Cascade	0	ABBOTT GLASAIR; Accumulation of wet snow on engine while landing approach
6/18/2006	Great Falls	0	CESSNA 180; Pilot's failure to adequately compensate for wind conditions
7/3/2006	Great Falls	0	CESSNA 195; Loss of control during takeoff roll and subsequent ground loop
5/3/2008	Great Falls	0	EA300/L; Pilot's misjudged landing flare
12/21/2008	Great Falls	0	CESSNA 180C; Failure to maintain directional control during the landing roll
10/18/2009	Sand Coulee	0	CESSNA A185F; Failure to maintain directional control during land with crosswind
9/28/2010	Great Falls	0	CESSNA 310R; Collapse of right landing gear while turning off active runway
9/2/2014	Neihart	1	CESSNA 177B; Pilot's failure to maintain clearance from terrain while maneuvering at low altitude in turbulent conditions over mountainous terrain.
12/10/2015	Great Falls	0	AIRBUS A319 115; Encounter with turbulence during initial descent.
TOTAL		10	

Source: FAA, 2016; http://www.faa.gov/data_research/accident_incident/

Federal Aviation Administration data indicate that between 1980 and 2016 there have been 10 fatalities in Cascade County from aircraft accidents. There have been no Federal disaster or State emergency declarations associated with the Transportation Accident hazard in Cascade County and the likelihood of an event resulting in a disaster declaration is considered low.

Vulnerability and Area of Impact

Privately-owned vehicles provide transportation for individuals in Cascade County using the federal interstate and state highway systems as well as county and private roads. Trucks and trailers carry interstate and intrastate cargo. Highway accidents caused by severe weather and high speeds occur frequently. Railroad related hazards such as derailments, toxic spill contamination, and vehicle collisions are a threat to Cascade County residents. According to the NTSB, more than 80 percent of

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public railroad crossings do not have lights and gates, and 60 percent of all railroad accidents occur at these unprotected crossings.

The MHMP analysis performed for Hazardous Material Incidents buffered the highways and railroads in Cascade County by 0.25 mile and using GIS intersected this layer with the MDOR parcel database and census data to determine the number of building stock and population vulnerable to this hazard. This analysis also relates to the Transportation Accident hazard (see *Section 4.2*).

Probability and Magnitude

Cascade County is vulnerable to all types of transportation emergencies. The magnitude of a transportation accident event would be determined by many factors including the location of impact and number of passengers. Little, if any, warning exists for transportation accidents. The greatest magnitude event would be one where mass fatalities result. A mass casualty incident involving a school bus is also a possibility and a concern since rural locations have limited resources making response time slow which could delay treatment of the injured.

In the past 10 years, there have been 21,396 motor vehicle accidents that resulted in 86 fatalities and 392 injuries in Cascade County. Therefore, the probability of future highway accidents is rated as “highly likely”. The MHMP Planning Team rated the railroad accident hazard as “highly likely” occurring more than once per year, and the aircraft accident hazard as “likely” occurring more than once a decade but not every year.

Future Development

Cascade County has no land use regulations that restrict building around industrial facilities or along transportation routes.

Climate Change

Climate change is not anticipated to directly impact the transportation accident hazard. Secondary impacts to public health may result due to increased smoke from wildfire activity which may increase highway accidents.

4.9 Flooding and Dam Failure

CPRI SCORES:
DAM FAILURE = 2.65
FLOODING = 2.8

Flooding

Description and History

A flood is a natural event for rivers and streams. Excess water from snowmelt and rainfall accumulates and overflows onto the banks and adjacent floodplains. Floodplains are lowlands, adjacent to rivers and lakes that are subject to recurring floods. A flash flood generally results from a torrential (short duration) rain or cloudburst on a relatively small drainage area. Ice jam flooding occurs when pieces of floating ice carried by the streams current accumulate at an obstruction to the stream. The water held back can cause flooding upstream, and if the obstruction suddenly breaks, flash flooding can then occur downstream as well. Dam failure is also a possibility with areas in the dam's inundation area subject to flooding.

It is estimated that flooding causes 90 percent of all property losses from natural disasters in the United States and kill an average of 150 people a year nationwide. Most injuries and deaths occur when people are swept away by flood currents and most property damage results from inundation by sediment-laden water. Faster moving floodwater can wash buildings off their foundations and sweep vehicles downstream. Pipelines, bridges, and other infrastructure can be damaged when high water combines with flood debris. Basement flooding can cause extensive damage to the structure and systems of a building.

Chinook winds, warm dry winds that can gust to 100 mph and that are typical to the area in March and April, often lead to the rapid melting of snow and cause flooding while the ground is still frozen. Major flooding occurs when rainstorms are combined with the heavier snowmelt in May and June. Flooding is also caused by high-intensity rainstorms later in the summer. Ice effects can also create flood problems in Great Falls. The Missouri River in the area from Craig to Hardy is also prone to flooding from ice jams.

The NWS provides short-term forecasts and warnings of hazardous weather to the public by producing regularly-scheduled severe weather outlooks and updates on various forms of hazardous weather including heavy rain and flooding. A "watch" is issued when conditions are favorable for severe weather in or near the watch area. A "warning" is issued when the severe weather event is imminent or occurring in the warned area. Warning and Advisory Criteria for flooding is presented in **Table 4.7-1**.

Table 4.7-1. Warning and Advisory Criteria for Flooding

Flooding	Warning Description
Flash Flood Watch	Issued when conditions are favorable for flash flooding. It does not mean that flash flooding
Flash Flood Warning	Flash flooding is imminent, water levels rise rapidly with inundation occurring in less than 6
Flood Watch	Issues when conditions are favorable for flooding. It does not mean flooding will occur, but it is
Flood Warning	Flooding is expected to occur more than 6 hours after the causative event.

Source: National Weather Service, 2016

Flooding in Great Falls has historically been caused by rapid snowmelt combined with heavy rainfall in the Sun and Missouri River Basins, causing the Missouri River and the Sun River to leave their

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banks. The Sun River basin drains approximately 2,020 square miles between the river headwaters at the Continental Divide and Great Falls, where the Sun River joins the Missouri River.

Widespread flooding occurred in Cascade County in 1894, 1899, 1908, 1916, 1927, 1936, 1948, 1953, 1958, 1964, 1965, 1966, 1969, 1975 and 2011. Several of these events created the need for evacuations and inflicted significant property damage. Cascade County received Presidential Disaster Declarations for flooding in 1964, 1975, 1981, and 2011 (**Table 4.7.2**). Statewide flood emergencies were declared in 1978, 1981, 1984, 1986, 1997, 1998, 2003, 2011 and 2013 (DMA, 2016).

Table 4.7-2. Federal Disaster Declarations from Flooding

Year	Event	FEMA Disaster No.	Details
1964	Flood	Not available	\$105 M in damages in Cascade County
1975	Flood	FDAA-472-DR-MT	\$74.3 M in damages in Cascade County.
1981	Flood	FEMA-640-DR-MT	Cascade plus 9 other counties affected with over \$4.3 M in damages.
2011	Flood	FEMA-1996-DR-MT	\$1.62 M in damages in Cascade County.

Notes: Damage figures adjusted for inflation to 2017 dollars.

A description of the several flood disasters is presented below.

June, 1948 - Rapid snowmelt resulting from an abnormally high snow pack in the Sun River and Missouri River basins coupled with general rainfall, resulted in high water in the Great Falls area due to the Sun River and Missouri River from June 1-19, 1948. About 68 residences were damaged by first floor flooding. Most streets and roads in the area were closed for several days due to the flood conditions (FEMA 2013).

June, 1953 - The flooding of June 1953 was due to prolonged rainfall over the basin upstream from Great Falls during the month of May. Flooding from the Missouri River took place in the portion of Great Falls located adjacent to the water-works road in the southern portion of the city. Flooding from the Sun River damaged at least 177 residences and seven businesses in the area (FEMA, 2013).

June, 1964 - In the second week of June 1964, the worst natural disaster in Montana's recorded history descended on the state in the form of heavy rains that quickly turned once picturesque creeks into raging, mile-wide rivers. Dams, roads, and railroads washed out, homes and ranches were swept away, and 30 people died. The area affected by the flooding amounted to nearly 30,000 square miles, or roughly 20 percent of the state. By Thursday, June 11, President Lyndon Johnson had declared nine counties in northwest and north-central Montana a federal disaster area. When mop-up operations ended, damages stood at an estimated at \$62 million (Montana Magazine of Western History, 2004), \$503 million in 2017 dollars.

Flooding in the western part of Great Falls resulted from overflow of both the Sun and Missouri Rivers. Flood damage at Great Falls from both streams was estimated at \$4,360,000 (\$34.3 million in 2017 dollars); residential damage was estimated to be more than \$3,160,000, commercial damage nearly \$200,000, and damage to streets and utilities exceeded \$1,000,000. Approximately 3,000 persons were evacuated from the flooded areas and boarded in shelters. Varying degrees of damage were sustained by 681 homes and 24 businesses. Flood depths from 10 to 12 feet were noted on several homes located in low-lying areas. A local survey later indicated that 518 families suffered 50 percent or more loss of personal possessions and of this number, 350 families lost 100 percent of their personal belongings. Damage to the Great Falls sewer system was great and the return of many

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evacuees to their homes was postponed for several days until sewer repairs could be made. Total damages in the Sun River basin were estimated at near \$9 million (\$70.7 million in 2017 dollars) (USACE, 1973; USACE, 1979).

June, 1975 - During the period from June 16-20, 1975, rainfall averaging from 3 to 10 inches fell over all of the Sun River basin and most of the Missouri River basin. This rainfall, coupled with snowmelt and super-saturated ground conditions resulted in the Sun River peaking at Great Falls on the morning of June 21st. Over 4,000 persons were evacuated from the floodplain in Great Falls.

Flooding in the western part of Great Falls resulted from high stages on the Sun River and backwater effects on the Missouri River caused by high inflows from the Sun River. Flood depths as great as 12 feet occurred in low-lying areas. Urban damages in Great Falls were estimated to be \$9,459,000 (\$74.3 million in 2017 dollars) including residential damage estimated to be more than \$8,700,000. Damage surveys conducted by the Corps of Engineers reported that 552 residences were flooded. Commercial damage amounted to \$100,000, and damages to streets and utilities were in excess of \$650,000 (USACE, 1979).

May, 1981 - The 1981 Cascade County flood began on May 21 when heavy rains caused Belt Creek to rise higher than seen in the 1953 flood. Water backed up by roads and debris at the Armington Bridge caused an emergency session of the Belt City Council to decide to evacuate the town's 900 residents. Reports came in from the Monarch area that U.S. 89 had washed out. Livestock on the Smith River was evacuated by helicopter and flood waters ate away approaches to the Truly Bridge. Flooding on the Sun River in West Great Falls caused flooding of some basements but no appreciable damage (Great Falls Tribune, *Professional Doomsayer Pleased with Flood Reaction*, May 30, 1981).

Three projects to save homes threatened by Belt Creek were completed by the U.S. Soil Conservation Service a week after the flood. The North Belt Creek Project, a quarter mile north of Belt, dredged a channel and constructed a small dike system to return the creek to its original channel where a diversion cut access to the main road for three homes and one trailer. The Nelson-Barker Project, between Belt and Armington, removed debris and placed rock to divert water away from structures where the creek took out five farm buildings during the flood. Third project was two miles south of Monarch to return Belt Creek to its original channel where it tore out part of Highway 89 and undermined the foundation of a house at one corner (Great Falls Tribune, *SCS Will Begin Work to Save Belt Creek-Threatened Homes*, June 6, 1981).

June, 2011 - Montana experienced floods of a magnitude rarely experienced in a state that more generally suffers from drought than flood. Three storm systems moved across the state dumping an extraordinary amount of precipitation. These systems moved through eastern Montana during May and through southwestern Montana in June. Snow in the eastern plains and saturated soils contributed to the increased runoff that occurred after the storms. Flooding continued into June because of snowmelt, ice jams, and reservoirs being unable to hold any more water. Record snowfall also contributed to the problems. The USDA Natural



Sun River flood of June 2011

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Resources Conservation Service (NRCS) issued its final 2011 snowpack report for Montana on June 1, 2011, indicating that river basins across the state had snowpack from 167 to 386 percent of average. NRCS' streamflow forecasts reflected the above average snowpack with forecasts from 149 to 251 percent of average for the state's river basins (USDA-NRCS, 2012).

As rain fell and snow melted, many rivers across central Montana swelled beyond their banks. Some locations across south-central Montana received nearly a foot of rain during the same period. Numerous roads and bridges were closed or washed out.

Flooding of Belt Creek and the Sun River caused extensive property damage in Cascade County communities. The 2011 flood caused the Sun River to rise 1 to 3 feet on the slopes of the West Great Falls levee. Coordinated releases from the Missouri River dams mitigated impacts from the flooding in Great Falls. Flood damages associated with the 2011 disaster declaration totaled 1,175,342 in Cascade County, \$209,935 in the City of Great Falls, \$107,757 in the Town of Belt, and \$7,065 in the Town of Neihart for a total of \$1,500,099 (\$1.6 million in 2017 dollars).

Project stakeholders recalled other flood events that occurred in Cascade County since the 2011 PDM Plan was adopted. These include ice jam flooding on the Missouri River in 2012 which caused damage by the Great Falls Tribune building, and a flash flood in 2016.

Dam Failure

Dams have been placed around Montana for many reasons including recreation, flood control, irrigation, water supply, hydroelectricity, and mining. Dams are built and owned by a variety of entities such as private individuals, utilities, and the government. Dams come in all shapes and sizes from small earthen dams to large concrete structures. The structural integrity of a dam depends on its design, maintenance, and weather/drainage situation. Problems arise when a dam fails and people and/or property lie in its inundation area. Dams can fail for a variety of reasons including seismic activity, poor maintenance, overwhelming weather and flow conditions, or by an intentional act. Dam failure can be compared to riverine or flash flooding in the area downstream from the dam, and sometimes for long distances from the dam, depending on the amount of water retained and the drainage area. Other dams may be located in areas that result in little if any damages during a failure.

The U.S. Army Corps of Engineers (USACE), National Inventory of Dams (NID) maintains a record of dams across the country. Hazard ratings are given to those dams for emergency management planning purposes. These ratings, high, significant, and low, are based on the potential for loss of life and property damage from the failure of the dam, not the condition or probability of the dam failing, as described in **Table 4.7-3**. Montana DES also keeps an extensive library of Emergency Action Plans (EAPs) for the state's high hazard dams. Cascade County DES maintains EAP copies for the high hazard dams in the county. NorthWestern Energy updates inundation mapping every year for the Missouri River dams and updates its EAPs.

Table 4.7-3. Hazard Ratings for Dams

Rating	Description
Low Hazard Potential	Dams assigned the low hazard potential classification are those where failure or misoperation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

Table 4.7-3. Hazard Ratings for Dams

Rating	Description
Significant Hazard Potential	Dams assigned the significant hazard potential classification are those dams where failure or misoperation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.
High Hazard Potential	Dams assigned the high hazard potential classification are those where failure or misoperation will probably cause loss of human life.

Source: National Inventory of Dams, 2016.

Cascade County has five high hazard dams and several significant or low hazard dams. **Figures 8 and 8A** show dam inundation areas in Cascade County and the City of Great Falls, respectively. In addition, there are nine high hazard dams in Teton, Lewis and Clark, Broadwater, and Gallatin counties that have the potential to impact Cascade County. **Table 4.7-4** presents details on these dams.

Table 4.7-4. Dams in and Affecting Cascade County

Dam Name	County	Drainage	Height (feet)	Maximum Storage (acre-ft)	Purpose	Type	Owner
Black Eagle Dam	Cascade	Missouri River	13	1,710	PG	Concrete	NWE
Cochrane Dam	Cascade	Missouri River	59	2,700	PG	Concrete	NWE
Morony Dam	Cascade	Missouri River	59	2,700	PG	Concrete	NWE
Rainbow Dam	Cascade	Missouri River	29	1,050	PG	Concrete	NWE
Ryan Dam	Cascade	Missouri River	61	5,000	PG	Concrete	NWE
Hebgen Lake Dam	Gallatin	Madison River	88	525,620	Rec	Earth	NWE
Canyon Ferry Dam	Lewis & Clark	Missouri River	225	2,051,000	PG, Rec	Concrete	BOR
Gibson Dam	Teton	Sun River	199	99,100	IR, FC, Rec	Concrete	BOR
Hauser Dam	Lewis & Clark	Missouri River	111	64,253	PG, Rec	Concrete	NWE
Holter Dam	Lewis & Clark	Missouri River	124	240,000	PG, Rec	Concrete	NWE
Nilan Dams (2)	Lewis & Clark	Sun River	51	15,600	IR, Rec	Earth	BOR
Pishkun Dikes (8)	Teton	Sun River	12-50	46,700	IR, Rec	Earth	BOR
Toston Dam	Broadwater	Missouri River					State
Willow Creek Dam	Lewis & Clark	Sun River	93	39,800	IR, Rec	Earth	BOR

Source: DNRC, 2016. Note: BOR = U.S. Bureau of Reclamation; FC = Flood Control; IR = Irrigation; NWE = NorthWestern Energy; PG = Power Generation; Rec = Recreation

The only dam failure in Cascade County occurred in 1908 when the Black Eagle dam was intentionally breached, as described below. There have been no federal disaster declarations issued to Cascade County for dam failure.

April 14, 1908 – Failure of Hauser Dam in Lewis and Clark County occurred after water pressure undermined the masonry footings (the steel dam itself being structurally sound). The first sign of trouble was when silt-heavy water began gushing from the base of the dam near the powerhouse. A power company employee, spotting the problem, ran into the powerhouse and told everyone to flee for their lives. About 15 minutes later, the masonry footings gave way, causing the upstream section of the dam to settle and a 30-foot wide breach to open in the dam. The water pouring through the breach further undermined the dam's footing, and six minutes later a 300-foot wide section of the dam tore loose. A surge of water 25 feet to 30 feet high swept downstream. The remaining sections

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of the dam, anchored to bedrock, helped hold back some of the water for a time, reducing the destructiveness of the flood. A Great Northern Railway locomotive was dispatched to the City of Great Falls, 70 miles downstream, warning stations along the way about the dam break.

The Craig Bridge withstood the flood with 14 inches of water flowing over its deck. Two passenger trains between Great Falls, and Helena safely returned to Cascade after messengers from Wolf Creek alerted them to the danger upriver. Craig sustained about \$40,000 in damages, which occurred mostly to the railroad tracks and bridge, whose approaches were washed away. Although Great Falls residents prepared for the worst, the water level rose only seven feet above normal when the flood waters reached the city the following morning. Fortunately, nobody was killed when the dam collapsed or drowned in the flood. Workers at the Boston and Montana Smelter in Great Falls improvised a wing dam to deflect the floodwaters away from the smelter site and dynamited a portion of Black Eagle Dam to allow the floodwaters to go downstream. Their efforts were not needed, as the Missouri River only rose 7 feet by the time it reached that city. Nonetheless, damages were estimated at more than \$1 million. Damages were estimated at more than \$1 million. (Axline, in Quarries of Last Chance Gulch).

Vulnerability and Area of Impact

Flooding

Development in floodplains results in a concurrent risk of property damage due to floods and impacts on city services for risk protection during flood season. **Figures 7 and 7A** present the flood-prone areas within Cascade County and Great Falls, respectively. These maps were developed from 2013 digital flood insurance rate maps from FEMA.

According to the 2013 Cascade County Flood Insurance Study (FEMA, 2013), most flood damage in Cascade County occurs from snowmelt, rainfall, or a combination thereof. The Missouri River is also prone to flooding from ice jams, principally in the area from Craig to Hardy. The area is commonly swept by high westerly “chinook” winds in March and April, which rapidly melt the winter snow and cause flooding while the ground is still frozen. Major flooding occurs when rainstorms are combined with the heavier snowmelt in May and June. Flooding is also caused by high-intensity rainstorms later in the summer. Floods that damage crops typically occur every three years. Cropland along the narrow valley bottoms and in the broad floodplains receive flooding from even minor storms. Areas vulnerable to flooding, as outlined in the 2013 Cascade County Flood Insurance Study, are summarized below.

City of Great Falls - Most of the City of Great Falls, including the main business district, lies east of the confluence of the Sun and Missouri Rivers and is safe from flooding because flow is controlled by dams. Much of the portion of Great Falls lying west of the Missouri River is in the Sun River floodplain and protected by a levee (see *Flood Protection Measures* section below).

Water-surface elevations in Great Falls are affected by Black Eagle Dam on the Missouri River and by 6th Street and Interstate 15 on the Sun River. All are manmade structures which create minor constrictions by eliminating floodwater conveying area. Black Eagle Dam, built in 1890 for power production, has flashboards which can be removed during a flood to eliminate the constrictive effect.

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Gibson Flats- Gibson Flats is located in a depression on the floodplain and has a history of flooding problems. The contributing drainage area for Gibson Flats is 5,120 acres, of which 200 acres are urban development within the City of Great Falls. Floodwater comes from three sources: local runoff, overflow from Sand Coulee Creek near the junction of Lyman Cutoff Road and Gibson Flats Road, and backup water from Sand Coulee Creek. The lack of an adequate outlet in Gibson Flats has caused floodwater to remain ponded for several weeks in the past. A combination of all three sources of flooding during a 100-year storm would cause water to reach depths of 6 feet in the Gibson Flats community. The frequency of flooding and the amount of runoff could increase with the continued construction of suburban homes, roads, highways, and additional subdivisions to the City of Great Falls (FEMA, 2013). The City of Great Falls has constructed an upstream detention and bypass channel to reduce flooding in the Gibson Flats area.

Town of Belt- Belt Creek flows north through the length of Belt. Although the channel is fairly deeply entrenched and most of the reach has embankments along the stream, the main channel in places is not sufficient to contain the 100-year flood. Businesses and residential structures were built adjacent to the main channel on ground having elevations lower than the top of the embankments; thus, the structures were subject to flooding from the 100-year flood (FEMA, 2013).

Town of Cascade - The floodplain of the Missouri river is subject to ice damming in most winters, however, limited development in the floodplain area has minimized potential catastrophic effects of this occurrence. The floodplain covers virtually all of the area within about ½ mile of town on the east side of the river south of Secondary 330. It extends for another 2 miles toward the east on the north side of the secondary road. Most of the land in this area is currently used for agriculture, primarily grazing. The Missouri river is prone to flooding in the area generally beyond the east bank (Town of Cascade Growth Policy, 2011).

Project stakeholders indicated that flash flooding associated with areas severely burned in wildfires are a concern. When moderate to heavy rains fall, an initial flush of ash can fill streams and rivers with ash and debris, which can adversely affect domestic water supplies for subdivisions and private property owners.

Dam Failure

Dams with the highest risk to life and property were they to breach are rated as high hazard dams. Those areas directly downstream from high hazard dams would be the areas most at risk for loss of life and structural damage. **Figures 8 and 8A** present the inundation area associated with the high hazard dams in Cascade County and Great Falls, respectively. Cascade County DES has EAPs for these dams and conducts regular exercises with the dam owner(s) and other emergency response personnel.

Flood Protection Measures

Two levees have been built along the Sun River for flood protection; the Vaughn levee which protects about 250 households (**Figure 7C**) and the West Great Falls levee which protects over 700 homes (**Figure 7B**). These levees protect property worth millions of dollars. Flood protection measures, as described in the Cascade County Flood Insurance Study (2013) are presented below.

City of Great Falls - A levee exists on the Sun River near Great Falls. Beginning in the 1950s, local officials and residents in West Great Falls sought help from the USACE to address serious flooding problems near the junction of the Sun and Missouri Rivers. After years of debate and litigation, the property owners in this area formed the West Great Falls Flood Control and Drainage District in 1976 to finance and maintain a system of flood control levees. In the early 1980s, levees were finally built in response to floods that had repeatedly caused significant damage to properties in the Sun River watershed, particularly major floods in 1964 and 1975.

The West Great Falls flood control project involves two elements; a local flood protection levee and 16 interior drainage structures including one for the Watson-Coulee drainage basin. The flood protection levee consists of approximately 31,800 linear feet of levee which is set back from the existing channel approximately 50 feet. The levee provides protection against the 500-year flood event for a large portion of West Great Falls. In 1979, it was estimated that the levee would prevent \$1,199,000 in average annual damages. Had the authorized flood protection project for Great Falls been constructed prior to the 1975 Presidential Flood Disaster, the city would not have experienced any flooding (USACE, 1976; USACE, 1979).

Because this levee has not been certified for flood protection, a Provisional Accreditation Levee (PAL) agreement was offered to the community until certification of the levees was obtained. The West Great Falls Levee District, the Cascade County Commissioners, and the City of Great Falls signed the PAL agreement in 2011. The PAL states that if complete data and documentation is not provided within 24 months of the PAL signing date, FEMA will initiate a revision to the DFIRMs to redesignate areas on the landward side of the levee.

This PAL designation expired at the end of 2013 but is none-the-less “accepted” until the area is remapped. Preferred Risk Flood Insurance Policies are being sold to homeowners in this area. The 2015 and 2016 USACE inspection of the levee rated as “acceptable” which is considered very good (Mares, personal communication, 2016). The 2013 DFIRMs show these areas as being protected.

Vaughn - A flood-control levee system exists on the Sun River near Vaughn. This levee has not been certified for flood protection so a PAL agreement was offered to the community until certification of the levees is obtained. The Vaughn Flood Control and Drainage District and Cascade County Commissioners signed the PAL agreement in 2013. If complete data and documentation is not provided within 24 months of the PAL signing date, FEMA will initiate a revision to the DFIRMs to redesignate areas on the landward side of the levee. The 2013 DFIRMs show these areas as being protected.

Town of Belt - Considerable channel and dike work has been done on Belt Creek through the corporate limits and for a short distance downstream from the corporate limits. In addition, the Town of Belt has been adding to the height of the dikes through unscheduled additions of riprap whenever materials and equipment are available (FEMA, 2013).

Floodplain and Floodway Management

The National Flood Insurance Program (NFIP) encourages local governments to adopt “sound” floodplain management programs to reduce private and public property losses due to floods. Cascade County, the City of Great Falls, and the Towns of Belt, Cascade and Neihart participate in the NFIP. **Table 4.7-5** presents statistics on flood insurance policies and losses.

Table 4.7-5. National Flood Insurance Program Statistics (through 8/31/2016)

Jurisdictions	Policies in Force	Insurance in Force	Number of Losses	Total Payments
Cascade County	272	\$58,206,300	144	\$326,285
Town of Belt	20	\$2,266,500	18	\$98,545
Town of Cascade	0	\$0	0	\$0
City of Great Falls	156	\$ 37,805,100	78	\$152,464
Town of Neihart	2	\$ 230,000	0	\$0

Source: FEMA, 2016. <http://bsa.nfipstat.fema.gov/reports/1011.htm#MTT>;
<http://bsa.nfipstat.fema.gov/reports/1040.htm#30>

Many of the flood prone areas in Cascade County are covered by Flood Insurance Rate Maps (FIRMs), developed by FEMA. These maps show areas of 100-year Special Flood Hazard Areas, commonly referred to as 100-year floodplains in the County. New digital FIRMs (DFIRMs) were adopted in 2013. The City of Great Falls has LIDAR data for the Sun and Missouri Rivers extending one mile beyond the city limits that was collected by the Public Works Department in 2009. There is no other LIDAR data for the streams and rivers in Cascade County. LIDAR, which stands for Light Detection and Ranging, is a remote sensing method that uses light in the form of a pulsed laser is used for flood mapping. The light pulses—combined with other data recorded by the airborne system— generate precise, three-dimensional information about the shape of rivers and streams and their surface characteristics.

Cascade County has a Floodplain and Floodway Management Ordinance to comply with the Montana Floodplain and Floodway Management Act and to ensure compliance with requirements for continued participation in the National Flood Insurance Program. The floodplain ordinances identify land use regulations to be applied to all identified 100-year floodplains within local jurisdictions. Most construction within the 100-year floodplain or floodway requires a permit obtained through the office of the Floodplain Program Administrator.

The City of Great Falls has floodplain zoning in effect. Construction is prohibited within the confines of the floodway but is allowed in the floodway fringe if built above or flood-proofed to an elevation equal to or greater than one foot above the 1-percent annual chance flood elevation.

According to DNRC, there were three repetitive loss properties in Cascade County and one in the City of Great Falls. A repetitive loss property is any insurable building for which two or more claims of more than \$1,000 were paid by the NFIP within any rolling 10-year period, since 1978. There are no severe repetitive loss properties in Cascade County. Severe repetitive loss properties have had at least four NFIP claim payments over \$5,000 each and the cumulative amount exceeding \$20,000; or, where at least two separate claim payments have been made with the cumulative amount exceeding the market value of the building. According to the City of Great Falls floodplain administrator, three of the repetitive loss properties are located in the Skyline Park Addition, outside the floodplain, and flooded due to stormwater issues. All flood issues associated with these properties have been mitigated.

The NFIP's Community Rating System (CRS) recognizes community efforts (beyond minimum standards) by reducing flood insurance premiums for the community's property owners. CRS discounts on flood insurance premiums range from 5 percent up to 45 percent. Those discounts

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provide an incentive for new flood protection activities that can help save lives and property in the event of a flood. To participate in the CRS, a community can choose to undertake some of the 18 public information and floodplain management activities. Based on the total number of points a community earns, the CRS assigns you to one of ten classes. Your discount on flood insurance premiums is based on your class. Cascade County, the City of Great Falls, and the Town of Belt all participate in the CRS and have a rating of 8 which provides a 10 percent discount in flood insurance premiums.

Probability and Magnitude

Flood listings with associated property damage from the SHELDUS database and Montana DES database of State and Federal disaster declarations are presented in **Table 4.7-6**.

Table 4.7-6. Cascade County Flood Events with Damages

Date	Injuries	Fatalities	Property Damage (2016 \$)	Crop Damage (2016 \$)	Remarks
3/17/1969	0	0	\$5,771	\$0	Flooding
7/3/1978	0	0	\$0	\$154,287	Tornado, flash flood, hail, rain
5/28/1987	0	0	\$1,771	\$18	Flood
5/28/1990	0	0	\$924	\$0	Urban flooding
8/18/1990	0	0	\$92	\$0	Urban flooding
8/20/1990	0	0	\$924	\$0	Urban flooding
6/19/1991	0	0	\$17,726	\$18	Flood
3/2/1994	0	0	\$20,363	\$20,363	Ice jam flooding
6/19/2003	0	0	\$328,027	\$0	Flooding
6/3/2005	0	0	\$142,162	\$0	Flood
6/2011	0	0	\$ 1,624,568	-	Presidential Disaster Declaration
TOTAL	0	0	\$2,142,328	\$174,686	

Source: SHELDUS, 2016 (adjusted to 2017 dollars); NCDC, 2016; USACE, 1973, 1976, 1979; DES, 2016; FEMA, 2013.

Notes: “-” = not available.

The Cascade County hazard area for this MHMP is shown on **Figures 7 and 7A**. Using GIS, the flood hazard area was intersected with the critical facility database and NRIS structures shapefile which was linked to the MDOR cadastral database for building values (**Table 4.7-7**). Vulnerable population was calculated using the NRIS structures shapefile and estimates by the U.S. Census that 2.35 individuals reside in each structure, 22.5 percent of whom are under age 18 and 17.4 percent of whom are over the age of 65.

Table 4.7-7. Cascade County Vulnerability Analysis; Flooding

Category	Cascade Co. (balance)	Great Falls, City	Belt, Town	Cascade, Town	Neihart, Town
Residential Property Exposure \$	\$114,923,448	\$92,198,951	\$2,997,636	\$0	\$685,682
# Residences At Risk	\$662	318	30	0	11
Commercial, Industrial & Agricultural Property Exposure \$	\$5,214,547	\$3,420,803	\$1,517,036	\$0	\$0
# Commercial, Industrial & Agricultural Properties At Risk	\$39	6	6	0	0
Critical Facilities Exposure Risk \$	\$86,828,071	\$32,110,966	\$5,462,543	\$0	\$0
# Critical Facilities At Risk	6	7	8	0	0
Bridge Exposure \$	\$93,227,824	\$7,974,774	\$371,995	\$0	\$0
# Bridges At Risk	41	4	1	0	0
Persons At Risk	1,555	747	71	0	26

Table 4.7-7. Cascade County Vulnerability Analysis; Flooding

Category	Cascade Co. (balance)	Great Falls, City	Belt, Town	Cascade, Town	Neihart, Town
Persons Under 18 At Risk	356	171	16	0	6
Persons Over 65 At Risk	231	111	11	0	4

The GIS analysis indicates that 50,163 acres in Cascade County (3 percent) are located within the 100-year flood hazard area including: 1,021 residences, 51 commercial, industrial and agricultural buildings, and 21 critical facilities. The *Flood* section in **Appendix C-2** presents the critical facilities and bridges located in the 100-year flood hazard area.

The dam inundation hazard area is shown in **Figures 8 and 8A**. Using GIS, this area was intersected with the critical facility database and MDOR cadastral database shapefile (**Table 4.7-8**). Vulnerable population was calculated using the NRIS structures shapefile and estimates by the U.S. Census that 2.35 individuals reside in each structure, 22.5 percent of whom are under age 18 and 17.4 percent of whom are over the age of 65.

Table 4.7-8. Cascade County Vulnerability Analysis; Dam Failure

Category	Cascade Co. (balance)	Great Falls, City	Belt, Town	Cascade, Town	Neihart, Town
Residential Property Exposure \$	\$433,839,391	\$931,597,349	\$0	\$11,484,952	\$0
# Residences At Risk	2,513	3,810	0	127	0
Commercial, Industrial & Agricultural Property Exposure \$	\$39,896,496	\$527,304,977	\$0	\$5,075,744	\$0
# Commercial, Industrial & Agricultural Properties At Risk	170	721	0	49	0
Critical Facilities Exposure Risk \$	\$840,641,796	\$301,844,790	\$0	\$2,260,064	\$0
# Critical Facilities At Risk	18	28	0	7	0
Bridge Exposure \$	\$107,266,202	\$14,020,357	\$0	\$0	\$0
# Bridges At Risk	54	12	0	0	0
Persons At Risk	5,906	8,954	0	298	0
Persons Under 18 At Risk	1,353	2,050	0	68	0
Persons Over 65 At Risk	881	1,334	0	44	0

The GIS analysis indicates that 87,369 acres in Cascade County (5 percent) are located in the dam inundation hazard area including 6,450 residences, 940 commercial, industrial and agricultural buildings, and 53 critical facilities. The *Dam Failure* section in **Appendix C-2** presents supporting documentation from the risk assessment including the critical facilities and bridges located in the dam inundation hazard area.

Based on the frequency of past events, the probability of flooding in Cascade County is rated as “likely”; an event that occurs less than once per year but more than once every 10 years. A dam failure event may allow for some advanced warning to the public, and therefore, the potential impact to the population is considered moderate. The probability of a high hazard dam breach in Cascade County was ranked as “possible” by the MHMP Planning Team.

Future Development

Prohibitive development areas were established as part of the Cascade County Growth Policy. The locations and boundaries of these areas include those areas adjoining a watercourse or drainage way,

which would be covered by the floodwater of a 100-year flood as delineated on the FEMA Flood Insurance Rate Maps. The Cascade County Subdivision Regulations restrict subdivision of a parcel of land which is determined to have any portion located in a regulated floodplain of a perennial stream.

Floodplain management regulations basically preclude new structural development within areas classified as designated floodways under state law. The City of Great Falls has floodplain zoning. Construction is prohibited within the confines of the floodway but is allowed in the floodway fringe if built above or flood-proofed to an elevation equal to or greater than one foot above the 100-year flood elevation. Permits are required before any filling or construction is done in designated flood hazard areas. These rules are intended to promote the wise use of floodplains and minimize the risk that residents and property owners face by being located in a flood hazard area.

The Growth Policy for the City of Great Falls recommends that a coordinated stormwater management plan be developed and a Capital Improvement Program be adopted to fund drainage improvements. The City's Growth Policy also recommends that sound stormwater management principles be incorporated into new land development regulations and the site plan review process. These regulations should allow and encourage creative ways to reduce runoff from parking lots and other impervious surfaces.

Climate Change

Use of historical hydrologic data has long been the standard of practice for designing and operating water supply and flood protection projects. For example, historical data are used for flood forecasting models and to forecast snowmelt runoff for water supply. This method of forecasting assumes that the climate of the future will be similar to that of the period of historical record. However, the hydrologic record cannot be used to predict changes in frequency and severity of extreme climate events such as floods. Going forward, model calibration or statistical relation development must happen more frequently, new forecast-based tools must be developed, and a standard of practice that explicitly considers climate change must be adopted.

The amount of snow is critical for water supply and environmental needs, but so is the timing of snowmelt runoff into rivers and streams. Rising snowlines caused by climate change will allow more mountain areas to contribute to peak storm runoff. High frequency flood events (e.g. 10-year floods) in particular will likely increase with a changing climate. Along with reductions in the amount of the snowpack and accelerated snowmelt, scientists project greater storm intensity, resulting in more direct runoff and flooding. Changes in watershed vegetation and soil moisture conditions will likewise change runoff and recharge patterns. As stream flows and velocities change, erosion patterns will also change, altering channel shapes and depths, possibly increasing sedimentation behind dams, and affecting habitat and water quality. With potential increases in the frequency and intensity of wildfires due to climate change, there is potential for more floods following fire, which increase sediment loads and water quality impacts.

As hydrology changes, what is currently considered a 1-percent-annual-chance (100-year flood) may strike more often, leaving many communities at greater risk. Planners will need to factor a new level of safety into the design, operation, and regulation of flood protection facilities such as dams, bypass channels and levees, as well as the design of local sewers and storm drains.

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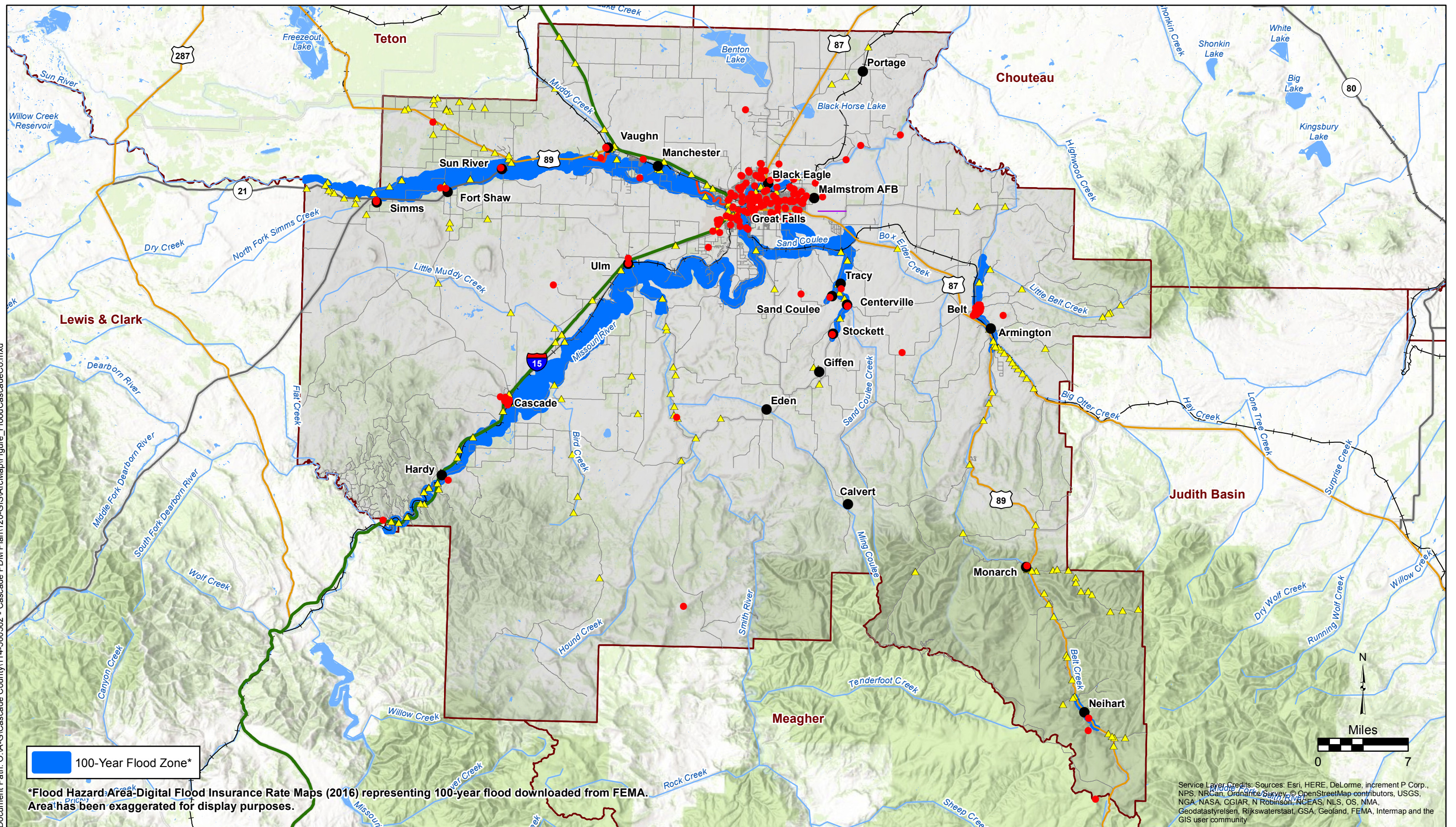
Small changes in rainfall, runoff, and snowpack conditions may have significant impacts for water resource systems, including dams. Dams are designed partly based on assumptions about a river's flow behavior, expressed as hydrographs. Changes in weather patterns can have significant effects on the hydrograph used for the design of a dam. If the hydrograph changes, it is conceivable that the dam can lose some or all of its designed margin of safety, also known as freeboard. If freeboard is reduced, dam operators may be forced to release increased volumes earlier in a storm cycle in order to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream.

Dams are constructed with safety features known as “spillways.” Spillways are put in place on dams as a safety measure in the event of the reservoir filling too quickly. Spillway overflow events, often referred to as “design failures,” result in increased discharges downstream and increased flooding potential. Although climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures.

Population, property, and critical facility exposure and vulnerability may increase as a result of climate change impacts to the flood hazard. Runoff patterns may change resulting in flooding in areas where it has not previously occurred with an increased risk to facilities that have not historically flooded. Additionally, changes in the management and design of flood protection critical facilities may be needed as additional stress is placed on these systems.

Population and property exposure and vulnerability to the dam failure hazard is unlikely to change as a result of climate change. The exposure and vulnerability of critical facilities are unlikely to change as result of climate change. Dam owners and operators may need to alter maintenance and operations to account for changes in the hydrograph and increased sedimentation.

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Date: 3/14/2017

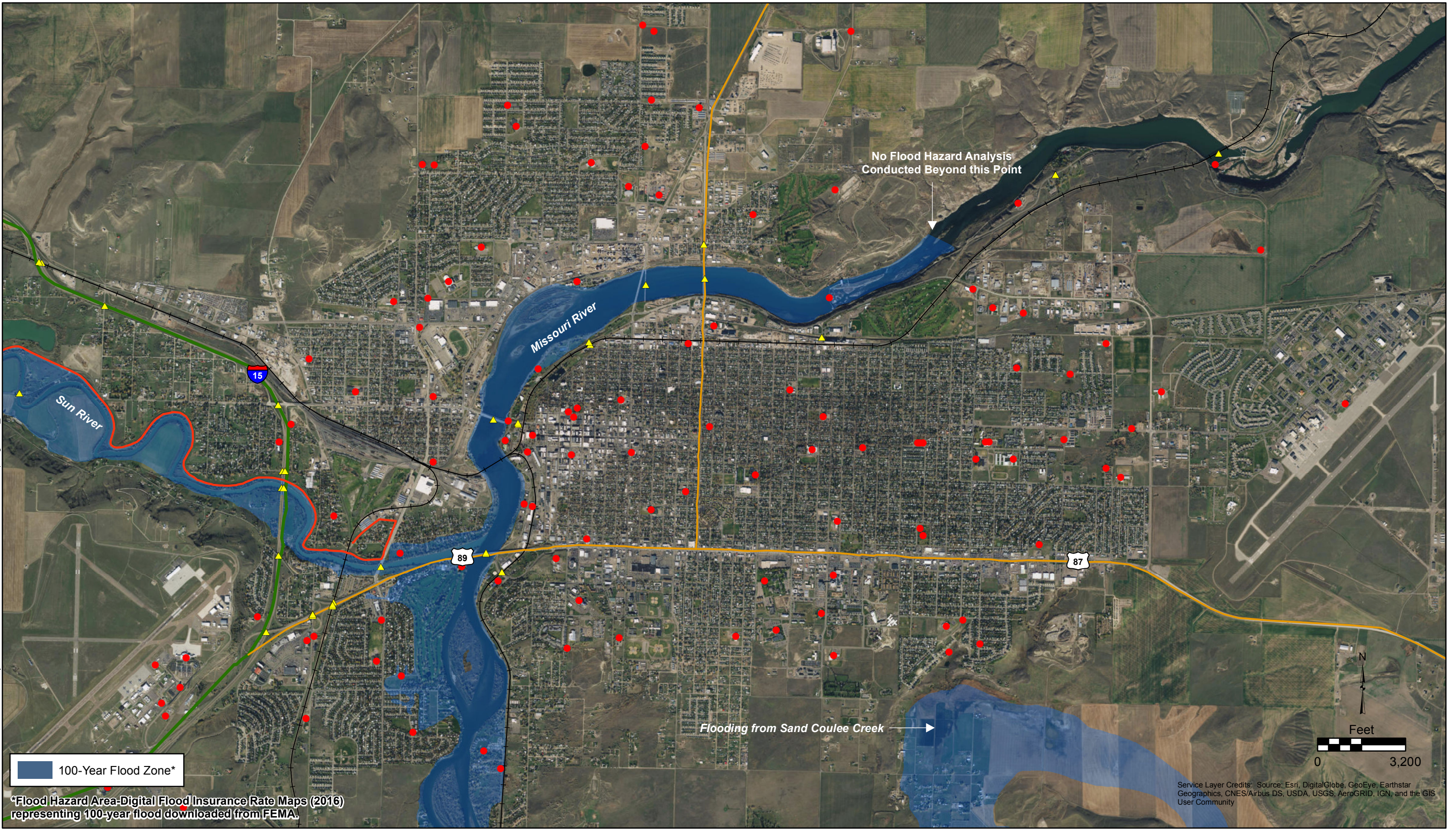


Legend

- | | | | | |
|---------------------|---------------------------|-------------------|------------------|-------------------|
| ● Critical Facility | ▲ Bridge | — Interstate | — Other Route | — River/Stream |
| ● Place | — Levee Critical Facility | — U.S. Highway | — Railroad | — County Boundary |
| ○ County Seat | | — Montana Highway | — Lake/Reservoir | |

Figure 7
Flood Hazard Area
Cascade County, Montana
Multi-Hazard Mitigation Plan

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Date: 3/17/2017

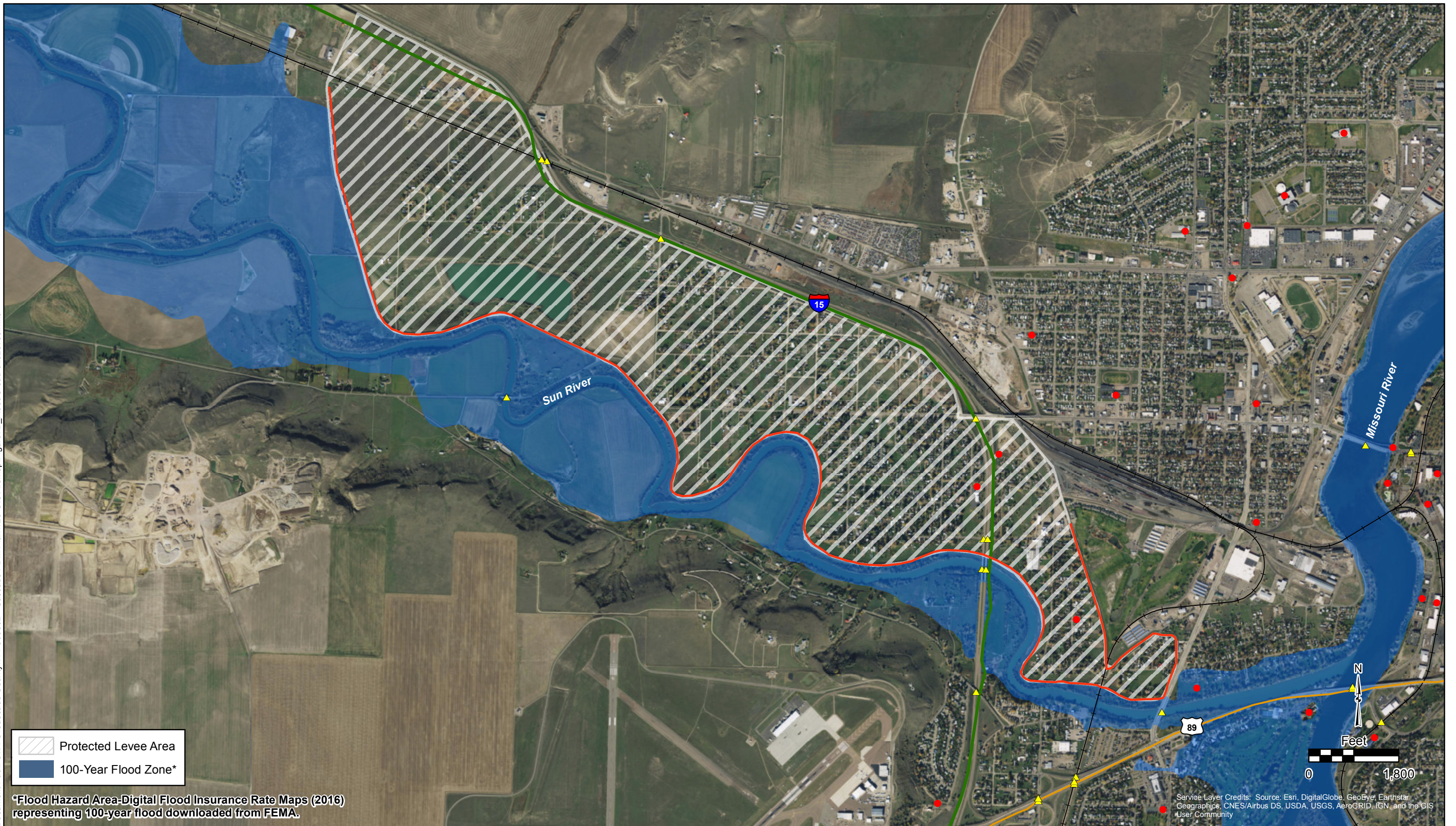


Legend

- | | | |
|---------------------------|----------------|-------------------|
| ● Critical Facility | — Interstate | — Montana Highway |
| ▲ Bridge | — U.S. Highway | — Railroad |
| — Levee Critical Facility | | |

Figure 7A
Flood Hazard Area
Great Falls, Montana
Multi-Hazard Mitigation Plan

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Date: 4/21/2017



Legend

- Critical Facility
- ▲ Bridge
- Great Falls-Sun River Levee Critical Facility
- Interstate
- U.S. Highway
- Montana Highway
- Railroad

Figure 7B
Flood Hazard Area
Great Falls-Sun River Levee
Great Falls, Montana
Multi-Hazard Mitigation Plan

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Date: 4/21/2017

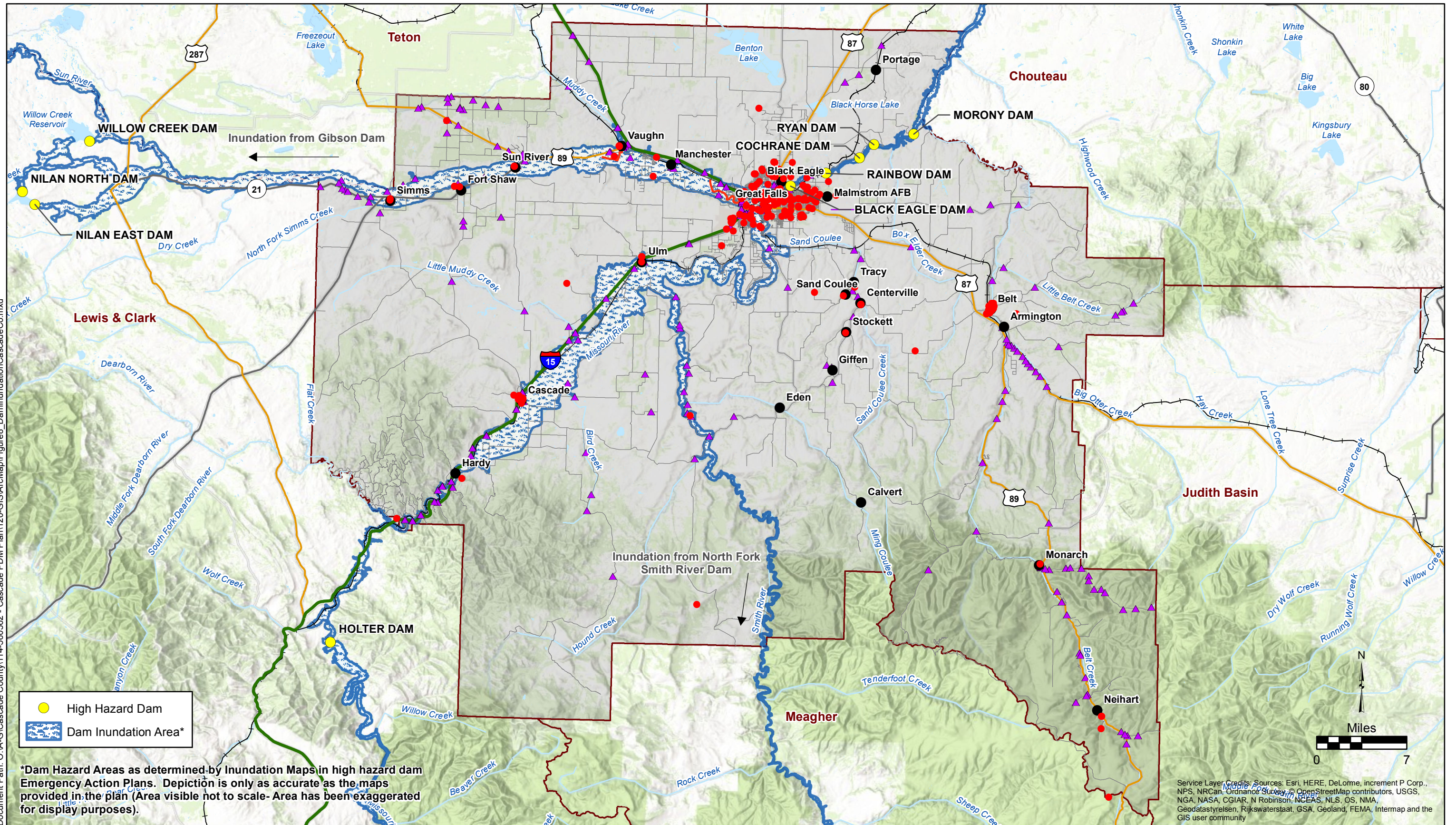


Legend

- Critical Facility
- Bridge
- Vaughn Levee Critical Facility
- Interstate
- U.S. Highway
- Montana Highway
- Railroad

Figure 7C
Flood Hazard Area
Vaughn Levee
Vaughn, Montana
Multi-Hazard Mitigation Plan

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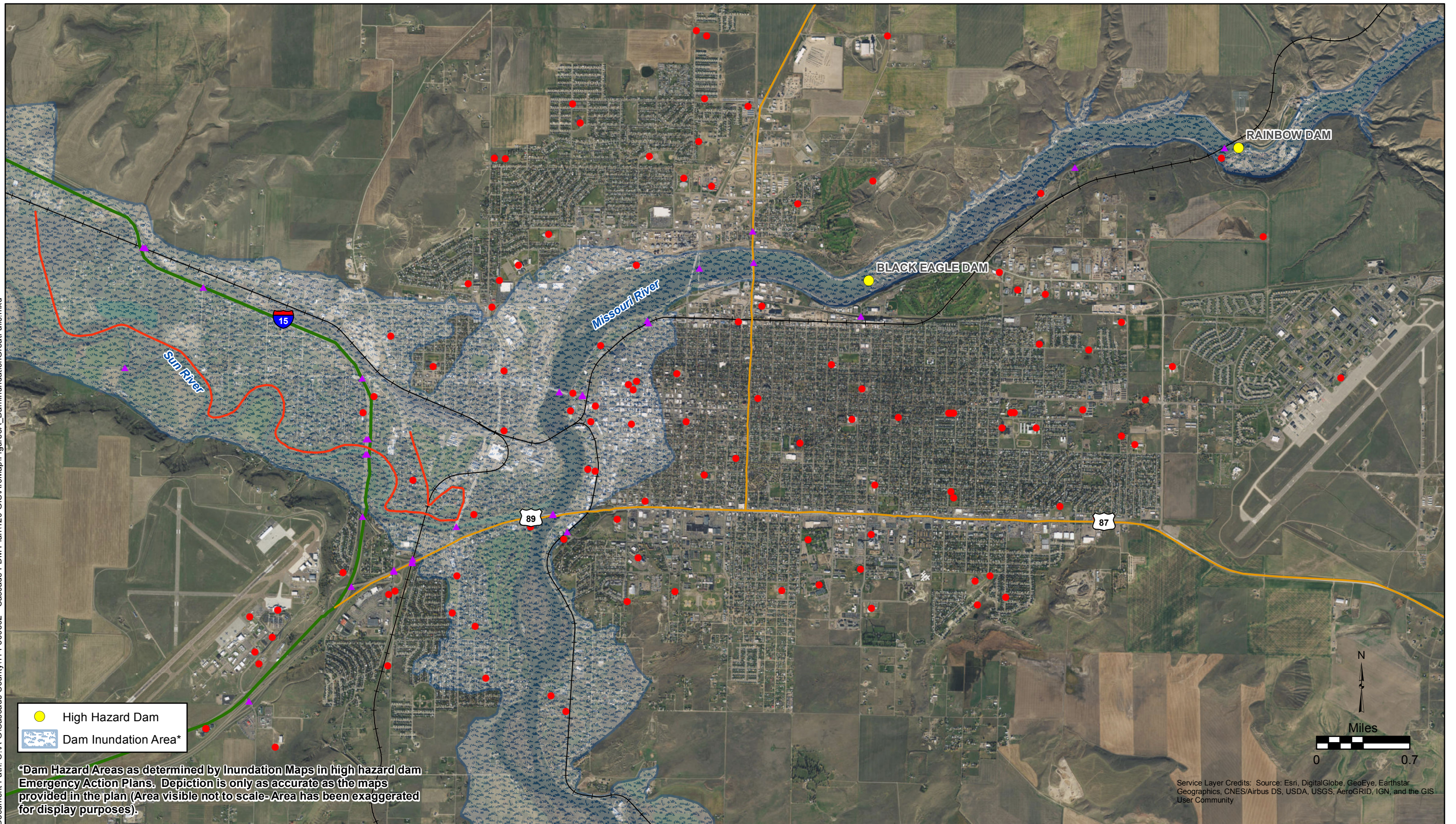


Date: 3/20/2017



Figure 8
Dam Failure Hazard Area
Cascade County, Montana
Multi-Hazard Mitigation Plan

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Date: 3/20/2017



Legend

- | | | | |
|---------------------|---------------------------|-------------------|-------------------|
| ● Critical Facility | — Levee Critical Facility | — U.S. Highway | — Railroad |
| ▲ Bridge | — Interstate | — Montana Highway | □ County Boundary |

Figure 8A
Dam Failure Hazard Area
Great Falls, Montana
Multi-Hazard Mitigation Plan

4.8 Terrorism, Violence and Civil Unrest

CPRI SCORE: 3.0

Description and History

Terrorism is defined in the Code of Federal Regulations as "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives". Terrorists look for visible targets where they can avoid detection before or after an attack such as international airports, large cities, major international events, resorts, and high-profile landmarks. Bombings involving detonated and undetonated explosive devices, tear gas, and pipe and fire bombs have been the most frequently-used terrorist method in the United States. Other possible methods include attacks on transportation routes, utilities, or other public services, or incidents involving chemical or biological agents. Cyber terrorism is profiled separately in this Plan, as Cyber Security in *Section 4.9*.

Lone gunman shootings (active shooters) are another form of terrorism. In the U.S., lone gunman shooting have occurred at schools, movie theaters, and other locations. Most lone gunman shootings occur where a specific place was deliberately selected as the location for the attack and was not simply a random site of opportunity. These shootings have sparked a political debate over gun violence, whether firearms should be allowed in the classroom and whether there should be stricter gun control. There have been no lone gunman shootings in Cascade County.

Civil unrest typically occurs when large groups, organizations, or distraught individuals take action with potentially disastrous or disruptive results. Civil unrest can be the product of another event that creates panic in the community. The potential exists in Cascade County for civil unrest that exceeds the capabilities of the local government to handle.

An incidence of civil unrest occurred in the town of Lincoln (Lewis and Clark County) in 2015 that is of concern because it involved a public land dispute by miners, a scenario that has the potential to occur in Cascade County.

August, 2015 – Members of the Oath Keepers, self-described constitutional advocates, came to Lincoln to intercede in a dispute between miners and the U.S. Forest Service. The noncompliance issues included construction of a garage without authorization, locking and posting gates into the claim, failure to remove explosives and needed reclamation of a road. The miners said that regulations do not apply because the mine claims predate 1955 regulations granting surface rights to the Forest Service. The Oath Keepers and other constitutionalist groups have since provided an armed security detail at the mine site. (Helena Independent Record, *Judge Urges Settlement in Lincoln-area Mining Dispute*, September 4, 2015).

According to the Southern Poverty Law Center (SPLC, 2017), an organization devoted to tracking hate groups in the United States, the number of anti-government groups in Montana held steady in 2016 while anti-Muslim activity surged. Of the 917 hate organizations identified in the latest report, 20 are located in Montana, including several white nationalist, anti-Muslim and anti-government groups scattered across the state. In Montana, the groups include the American Freedom Party, the John Birch Society, the Oath Keepers and ACT for American, among others. There were no hate groups identified in Great Falls (Great Falls Tribune, *Hate Groups on the Rise Across Montana, Nation*, February 15, 2017). The Southern Poverty Law Center had previously indicated that two chapters

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of the Klu Klux Klan were active in Great Falls. This report is attributable to one local individual with ties to the organization.

Violent protests and riots resulting from police brutality against African Americans gained wide spread notoriety in the recent decade, and the tensions ignited after particular incidents such as the killings of Trayvon Martin (2012), Michael Brown, Jr (2014) and Freddie Gray (2015). Due to the demographics of Cascade County, racial violence is not likely to present a great risk.

No disaster declarations have been issued to Cascade County for terrorism, violence or civil unrest. Emergency declarations in Montana are summarized in **Table 4.8-1**.

Table 4.8-1. Montana Terrorism, Violence and Civil Unrest Emergency Declarations

Declaration	Date	Magnitude	Comments
N/A	Jan-Feb 1979	Activation of National Guard for State Institutions strike	No casualties; \$1,393,714 costs
State EO-03-91	April 1991	Activation of National Guard and Assistance Statewide for State Institutions Strike	No casualties
State EO-10-96	April 23, 1996	Incident Response for Anniversary of Waco and Oklahoma City Incidents	No casualties; \$4,368 costs
State EO-23-01	September 11, 2001	Emergency Declaration following the World Trade Center and Pentagon terrorist attacks	No casualties
State EO 26-01	September 28, 2001	National Guard activation to provide personnel for airport security	No casualties

Source: Montana DES, 2013

Vulnerability and Area of Impact

The origins and targets for terrorism and civil unrest are difficult to predict. Individuals or groups that feel oppressed on any issue can resort to violent acts to inflict harm and damage in an attempt to gain publicity or affect policy. Montana has traditionally attracted activist/extremist individuals and groups because of its low population and large geographic area. Groups active in Montana vary from white supremacists to single issue groups, such as environmental extremists. According to the Southern Poverty Law Center, an organization that tracks hate groups in the U.S., no hate groups are currently active in Cascade County.

The densely populated urban area of Great Falls is the most vulnerable to the terrorism hazard due to the close proximity to hazardous materials facilities and government buildings. Domestic and international terrorism can be hard to predict, and therefore, specific targets cannot be identified. As a whole, Cascade County is at a very low risk of terrorism in comparison to other parts of the country.

The presence of Malmstrom AFB and the 341st Missile Wing LGM-30 Minuteman Missile Launch Sites across the county may be perceived by some as presenting an enhanced terrorism risk in Cascade County. Even though the locations of the missile silos are well known, it would not possible for a terrorist group to penetrate a U.S. nuclear silo and start a nuclear war.

The effects of civil unrest and violence are typically felt by the population. The greatest risk is to human lives during times of unrest. Looting is commonly found in association with these types of events. Therefore, this hazard places both the population and property at risk. Urban areas and places of public gathering are generally areas of greatest risk.

Probability and Magnitude

The probability of a terrorist or civil unrest event affecting Cascade County directly is difficult to determine. The county is not considered a specific terrorist target nor is it an area of high risk for civil unrest. As with any area, a shooting by a disgruntled person, employee, or student is always possible. A large-scale attack cannot be ruled out, and therefore, a small probability exists. Of greater probability is a national terrorist attack that has an indirect effect on Cascade County through its economy.

The effects of terrorism can vary significantly from loss of life and injuries to property damage and disruptions in services such as electricity, water supply, public transportation, and communications.

Due to the lack of past events in Cascade County, the probability of future terrorism events is rated as “infrequent”. The MHMP Planning Team rated the terrorism/civil unrest/violence hazard as “possible” due to the frequency with which these somewhat random events are impacting U.S. communities. Terrorism is considered an emerging hazard with little to no history in the region but sporadic incidents occurring with more frequency across the nation.

Future Development

Future development should have little to no impact on the terrorism or violence threat. Given the goals of eco-terrorists; however, future development could serve as the basis for an event over controversial development.

Climate Change

Many academics and national security experts agree that climate change contributes to an uncertain world where terrorism can thrive. Climate change not only threatens the environment, it can lead to greater instability and fuel global conflict and terrorism. Some of the least stable states in the world will face changing weather patterns that reduce arable land and fresh-water supplies, in turn driving mass-migration, provoking resource conflicts, and fostering global health threats.

4.9 Cyber Security

CPRI SCORE: 3.55

Description and History

Networked technologies touch every corner of the globe and every facet of human life. They have driven innovation and spurred economic prosperity. However, the very technologies that enable these benefits offer new opportunities for malicious and unwanted cyber activities.

Cyberterrorism is the use of information technology by terrorist groups and individuals to further their agenda. This can include use of information technology to organize and execute attacks against networks, computer systems and telecommunications infrastructures, or for exchanging information or making threats electronically. Examples are hacking into computer systems, introducing viruses to vulnerable networks, web site defacing, or terroristic threats made via electronic communication. Cyberterrorism can also include attacks on Internet business, but when this is done for economic motivations rather than ideological, it is typically regarded as cybercrime.

As the Internet becomes more pervasive in all areas of human endeavor, individuals or groups can use the anonymity afforded by cyberspace to threaten citizens, specific communities and entire countries, without the inherent threat of capture, injury, or death to the attacker that being physically present would bring. Many groups such as *Anonymous*, use tools such as denial-of-service attack to attack and censor groups who oppose them, creating many concerns for freedom and respect for differences of thought.

Dependence on the internet on a worldwide scale, creates a platform for international cyber terror plots to be formulated and executed as a direct threat to national security. For terrorists, cyber-based attacks have distinct advantages over physical attacks. They can be conducted remotely, anonymously, and relatively cheaply, and they do not require significant investment in weapons, explosive and personnel. The effects can be widespread and profound. Incidents of cyberterrorism are likely to increase. They will be conducted through denial of service attacks, malware, and other methods that are difficult to envision today.

Public interest in cyberterrorism began in the late 1980s with the widespread use of the Internet. As 2000 approached, the fear and uncertainty about the millennium bug heightened, as did the potential for attacks by cyber terrorists. The terrorist attacks on September 11, 2001 and the ensuing “War on Terror” led to further media coverage of the potential threats of cyberterrorism in the years following. The possibility of a large attack making use of computer networks to sabotage critical infrastructure with the aim of putting human lives in jeopardy or causing disruption on a national scale, either directly or by disruption of the national economy, has been a concern for the past decade.

There is no history of cybercrime in Cascade County. No disaster declarations have been issued to Cascade County for breaches in cyber security.

Vulnerability and Area of Impact

The vulnerability of local communities to a breach in cyber security is highlighted in the document, *Understanding the Cyber Threat, a Policy Guide for Legislators* (Governing Institute, 2017). They describe the serious business risk to government operations that cyber threats represent, as follows:

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Attacks have the potential to cripple vital government services and damage public infrastructure. All government agencies hold valuable or sensitive material, whether its citizen records, financial information or procurement data. Therefore, everyone is a target. And in today's highly interconnected world, each agency—no matter how small—is a stepping stone to another. So even a seemingly minor breach can have wide-ranging implications.

Agencies also are under nearly constant assault. Hackers know that state and local governments often lag behind commercial entities in cybersecurity readiness. Consequently, the number of attackers probing municipal systems for vulnerabilities is exploding—everyone from small-time crooks equipped with black-market ransomware kits, to nation states and organized crime syndicates armed with sophisticated cyber weapons.

The threats are wide-spread. Small towns and school districts are hit with ransomware that shuts down computer systems until they make a payment. Thieves steal citizen identities and financial information from state agency databases. Water authorities endure surgical strikes that use specialized computer code to destroy water pumps.

The most concerning is that the seeds for future attacks are quietly being sown into government networks through a technique known as advanced persistent threats. This is malware code that can be planted in a device today, and even if you remove the device, the malware stays embedded in your network and data. It can be used by cyber criminals for years. (Governing Institute, 2017).

Probability and Magnitude

The probability of a breach in cyber security impacting Cascade County is difficult to determine. The county is not considered a specific target; however, the possibility of a cyberattack cannot be ruled out. Of greater probability is a national cyberattack that has an indirect effect on the economy of Cascade County. Cyber terrorism is considered an emerging hazard with little to no history in the region but incidents occurring with more frequency across the globe. As such, the probability of a future incident in Cascade County was rated by the Planning Team as “likely”.

The effects of cyber terrorism can vary significantly from loss of life and injuries to property damage and disruption in services such as electricity, water supply, public transportation, and communications. Cyber terrorism could involve destroying the actual machinery of the information infrastructure, remotely disrupting the information technology underlying the Internet, government computer networks, or critical civilian systems such as financial networks or mass media, or using computer networks to take over machines that control traffic lights, power plants, or dams. If cyber-terrorists managed to disrupt financial markets or media broadcasts, an attack could undermine confidence and cause panic. Attacks could also involve remotely hijacking control systems, with potentially dire consequences, such as breaching dams, colliding airplanes, or shutting down the power grid.

Future Development

Future development should have little to no impact on the threat of cyber security.

Climate Change

Both cyber threats and climate change are security risks that can affect the safety and security of our most basic resources, such as water, energy and infrastructure, mostly due to a common factor: interconnectedness. As human beings and as nations, we are and always will be directly connected to our environment, as it provides us with the resources necessary for both survival and prosperity. We have also become intimately connected and dependent on our computer-based technologies, with cyberspace and the Internet being a primary conduit (Allen, 2014).

And just as climate change can affect our access to (and supply of) water and energy, a cyber-attack on computers and industrial equipment that run water treatment facilities and power plants can have significant negative consequences (Allen, 2014).

4.10 Risk Assessment Summary

This section summarizes the results of the individual risk assessments presented under the hazard profiles. There have been three repetitive loss properties due to flooding in Cascade County and one in the City of Great Falls, all of which have been mitigated. There have been no repetitive loss properties due to flooding in the Towns of Belt or Neihart. Neither Cascade County nor Great Falls, Belt, Cascade, or Neihart have had repetitive loss properties associated with other hazards. Annual loss estimates are presented for each hazard where damage data is available. Future development projects in Cascade County are discussed as they relate to the hazard areas.

Vulnerability Analysis - Loss Estimation Summary

Estimating potential losses and calculating risk requires evaluating where hazard areas and vulnerabilities to them coincide, how frequently the hazards occur, and then estimating the magnitude of damage resulting from a hazard event. Rather than estimating loss, a vulnerability assessment was completed which estimates building stock exposure. *Section 4.1* presents the methodology for the vulnerability assessment completed for the 2017 MHMP. **Tables 4.10-1 through 4.10-5** present the results of the vulnerability assessment for each hazard for residential and commercial/industrial/agricultural structures, critical facilities, bridges, and population in Cascade County, Great Falls, Belt, Cascade and Neihart. **Appendix C** contains supporting information.

Composite Hazard Map and Future Development

Figures 9 and 9A 10A present the composite of hazard prone areas in Cascade County which is an overlay of the hazardous material, wildfire, flooding, and dam failure hazard areas.

Growth policies for Cascade County (2014) and the City of Great Falls (2013) were reviewed for future development that may take place. These areas are listed below and shown on **Figures 9 and 9A**. **Table 4.10-6** indicates which hazards each of the future development areas are exposed to.

- Great Falls Residential Growth – Areas where existing water/wastewater infrastructure exist and areas associated with two new road projects.
- Great Falls Commercial Growth - Mixed use areas in various locations.
- Great Falls Industrial Growth – Associated with three industrial Tax Increment Finance district (TIF) districts (area around Great Falls International Airport, north of Malmstrom AFB bordering NE Bypass, and east of US 87 north of Black Eagle).
- Big Otter Wind Energy Project - Developer, Invenergy, proposes 16 wind turbines connecting into an existing transmission line located between Belt and Monarch.
- Mountain View Subdivision - 24 lots in Section 26, T20N R2E.
- Industrial Subdivision - 11 lots located between I-15 and Vaughn South Frontage Rd, in Section 36, T21N R2E.
- Ranches at Belt Creek Subdivision - Near Belt in Section 18, T18N R7E.
- Copper Basin Subdivision - 22 lots in Black Eagle, in the SW $\frac{1}{4}$, Section 31, T21N R4E.
- Larkspur Estates Subdivision - 12 residential lots in NW $\frac{1}{2}$ of SW $\frac{1}{4}$ Section 27, T20N R3E.
- Spring Tree Ridge South Subdivision - 9 residential lots in NE $\frac{1}{4}$ Section 33, T20N R 3E.
- Cottonwood Glen Subdivision - 23 residential lots in Sections 4, 5, and 8, T19N R 3E.

Table 4.10-1. Hazard Vulnerability Summary; Cascade County (balance)

Hazard	Residential Building Stock - \$ Exposure in Hazard Area	# Residential Structures in Hazard Area	Commercial, Industrial & Agricultural Building Stock - \$ Exposure in Hazard Area	# Commercial, Industrial & Agricultural Structures in Hazard Area	Critical Facility \$ Exposure in Hazard Area	# Critical Facilities Exposure in Hazard Area	Bridge Exposure \$	# Bridges in Hazard Area	Persons in Hazard Area	Under 18 in Hazard Area	Over 65 in Hazard Area
Hazardous Material Incidents	\$402,495,883	2,935	\$133,811,952	419	\$848,395,808	37	\$140,446,775	125	6,898	1,579	1,029
Wildfire	\$1,299,940,864	6,961	\$166,381,741	581	\$717,190,781	53	\$139,411,573	177	16,359	3,733	2,429
Severe Weather & Drought	\$90,564,393,678,732	7,501	\$192,425,601	647	\$855,776,573	56	\$161,637,474	204	17,629	4,037	2,627
Communicable Disease	\$90,564,393,678,732	7,501	\$192,425,601	647	\$855,776,573	56	\$161,637,474	204	17,629	4,037	2,627
Transportation Accidents	\$402,495,883	2,935	\$133,811,952	419	\$848,395,808	37	\$140,446,775	125	6,898	1,579	1,029
Flooding	\$114,923,448	662	\$5,214,547	39	\$86,828,071	6	\$93,227,824	41	1,555	356	231
Dam Failure	\$433,839,391	2,513	\$39,896,496	170	\$840,641,796	18	\$107,266,202	54	5,906	1,353	881
Terrorism	\$90,564,393,678,732	7,501	\$192,425,601	647	\$855,776,573	56	\$161,637,474	204	17,629	4,037	2,627
Cyber Security	\$90,564,393,678,732	7,501	\$192,425,601	647	\$855,776,573	56	\$161,637,474	204	17,629	4,037	2,627

Table 4.10-2. Hazard Vulnerability Summary; City of Great Falls

Hazard	Residential Building Stock - \$ Exposure in Hazard Area	# Residential Structures in Hazard Area	Commercial, Industrial & Agricultural Building Stock - \$ Exposure in Hazard Area	# Commercial, Industrial & Agricultural Structures in Hazard Area	Critical Facility \$ Exposure in Hazard Area	# Critical Facilities Exposure in Hazard Area	Bridge Exposure \$	# Bridges in Hazard Area	Persons in Hazard Area	Under 18 in Hazard Area	Over 65 in Hazard Area
Hazardous Material Incidents	\$4,691,105,943	10,736	\$1,395,432,061	1,646	\$663,373,830	69	\$16,933,895	19	25,230	5,778	3,759
Wildfire	\$106,532,382	363	\$15,769,986	14	\$66,481,888	12	\$0	0	853	195	127
Severe Weather & Drought	\$7,613,796,311	21,987	\$1,615,129,340	1,950	\$915,180,287	108	\$16,933,895	19	51,669	11,832	7,699
Communicable Disease	\$7,613,796,311	21,987	\$1,615,129,340	1,950	\$915,180,287	108	\$16,933,895	19	51,669	11,832	7,699
Transportation Accidents	\$4,691,105,943	10,736	\$1,395,432,061	1,646	\$663,373,830	69	\$16,933,895	19	25,230	5,778	3,759
Flooding	\$92,198,951	318	\$3,420,803	6	\$32,110,966	7	\$7,974,774	4	747	171	111
Dam Failure	\$931,597,349	3,810	\$527,304,977	721	\$301,844,790	28	\$14,020,357	12	8,954	2,050	1,334
Terrorism	\$7,613,796,311	21,987	\$1,615,129,340	1,950	\$915,180,287	108	\$16,933,895	19	51,669	11,832	7,699
Cyber Security	\$7,613,796,311	21,987	\$1,615,129,340	1,950	\$915,180,287	108	\$16,933,895	19	51,669	11,832	7,699

Table 4.10-3. Hazard Vulnerability Summary; Town of Belt

Hazard	Residential Building Stock - \$ Exposure in Hazard Area	# Residential Structures in Hazard Area	Commercial, Industrial & Agricultural Building Stock - \$ Exposure in Hazard Area	# Commercial, Industrial & Agricultural Structures in Hazard Area	Critical Facility \$ Exposure in Hazard Area	# Critical Facilities Exposure in Hazard Area	Bridge Exposure \$	# Bridges in Hazard Area	Persons in Hazard Area	Under 18 in Hazard Area	Over 65 in Hazard Area
Hazardous Material Incidents	\$7,205,917	80	\$1,564,756	8	\$5,708,132	11	\$371,995	1	188	43	28
Wildfire	\$8,663,740	98	\$4,223,279	14	\$7,024,595	16	\$371,995	1	230	53	34
Severe Weather & Drought	\$8,663,740	98	\$4,223,279	14	\$7,024,595	16	\$371,995	1	230	53	34
Communicable Disease	\$8,663,740	98	\$4,223,279	14	\$7,024,595	16	\$371,995	1	230	53	34
Transportation Accidents	\$7,205,917	80	\$1,564,756	8	\$5,708,132	11	\$371,995	1	188	43	28
Flooding	\$2,997,636	30	\$1,517,036	6	\$5,462,543	8	\$371,995	1	71	16	11
Dam Failure	\$0	0	\$0	0	\$0	0	\$0	0	0	0	0
Terrorism	\$8,663,740	98	\$4,223,279	14	\$7,024,595	16	\$371,995	1	230	53	34
Cyber Security	\$8,663,740	98	\$4,223,279	14	\$7,024,595	16	\$371,995	1	230	53	34

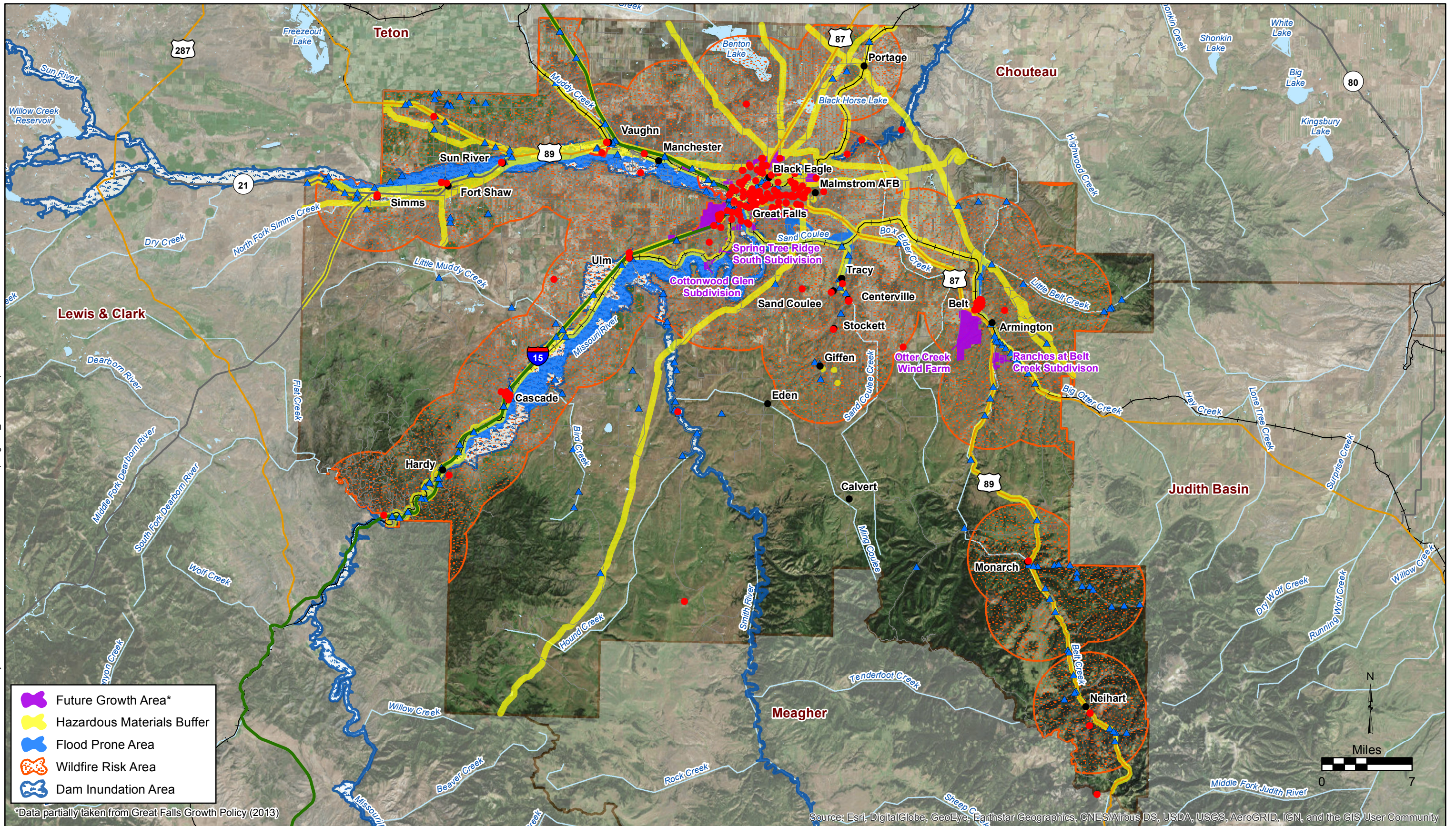
Table 4.10-4. Hazard Vulnerability Summary; Town of Cascade

Hazard	Residential Building Stock - \$ Exposure in Hazard Area	# Residential Structures in Hazard Area	Commercial, Industrial & Agricultural Building Stock - \$ Exposure in Hazard Area	# Commercial, Industrial & Agricultural Structures in Hazard Area	Critical Facility \$ Exposure in Hazard Area	# Critical Facilities Exposure in Hazard Area	Bridge Exposure \$	# Bridges in Hazard Area	Persons in Hazard Area	Under 18 in Hazard Area	Over 65 in Hazard Area
Hazardous Material Incidents	\$25,278,675	261	\$6,731,463	61	\$7,198,346	11	\$0	0	613	140	91
Wildfire	\$25,278,675	261	\$6,731,463	61	\$7,198,346	11	\$0	0	613	140	91
Severe Weather & Drought	\$25,278,675	261	\$6,731,463	61	\$7,198,346	11	\$0	0	613	140	91
Communicable Disease	\$25,278,675	261	\$6,731,463	61	\$7,198,346	11	\$0	0	613	140	91
Transportation Accidents	\$25,278,675	261	\$6,731,463	61	\$7,198,346	11	\$0	0	613	140	91
Flooding	\$0	0	\$0	0	\$0	0	\$0	0	0	0	0
Dam Failure	\$11,484,952	127	\$5,075,744	49	\$2,260,064	7	\$0	0	298	68	44
Terrorism	\$25,278,675	261	\$6,731,463	61	\$7,198,346	11	\$0	0	613	140	91
Cyber Security	\$25,278,675	261	\$6,731,463	61	\$7,198,346	11	\$0	0	613	140	91

Table 4.10-5. Hazard Vulnerability Summary; Town of Neihart

Hazard	Residential Building Stock - \$ Exposure in Hazard Area	# Residential Structures in Hazard Area	Commercial, Industrial & Agricultural Building Stock - \$ Exposure in Hazard Area	# Commercial, Industrial & Agricultural Structures in Hazard Area	Critical Facility \$ Exposure in Hazard Area	# Critical Facilities Exposure in Hazard Area	Bridge Exposure \$	# Bridges in Hazard Area	Persons in Hazard Area	Under 18 in Hazard Area	Over 65 in Hazard Area
Hazardous Material Incidents	\$5,234,388	61	\$1,871,664	4	\$887,371	2	\$258,394	2	143	33	21
Wildfire	\$5,425,218	63	\$1,871,664	4	\$887,371	2	\$258,394	2	148	34	22
Severe Weather & Drought	\$5,425,218	63	\$1,871,664	4	\$887,371	2	\$258,394	2	148	34	22
Communicable Disease	\$5,425,218	63	\$1,871,664	4	\$887,371	2	\$258,394	2	148	34	22
Transportation Accidents	\$5,234,388	61	\$1,871,664	4	\$887,371	2	\$258,394	2	143	33	21
Flooding	\$685,682	11	\$0	0	\$0	0	\$0	0	26	6	4
Dam Failure	\$0	0	\$0	0	\$0	0	\$0	0	0	0	0
Terrorism	\$5,425,218	63	\$1,871,664	4	\$887,371	2	\$258,394	2	148	34	22
Cyber Security	\$5,425,218	63	\$1,871,664	4	\$887,371	2	\$258,394	2	148	34	22

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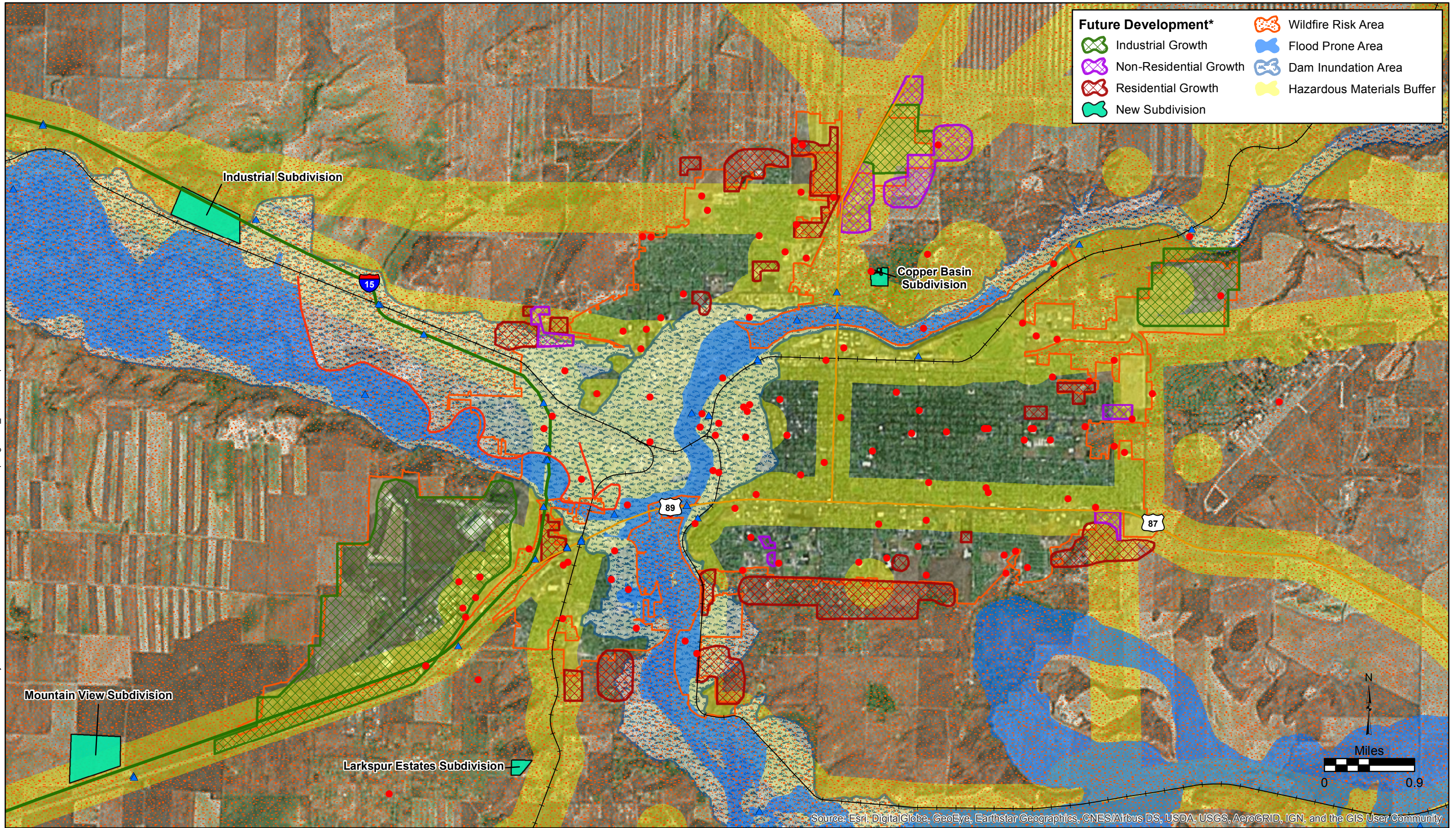


Legend

- | | | | | |
|---------------------------|-------------------|----------------|---------------|-------------------|
| ● Critical Facility | ○ County Seat | — Interstate | — Other Route | — Lake/Reservoir |
| ● Place | ▲ Bridge | — U.S. Highway | — Railroad | — River/Stream |
| — Levee Critical Facility | — Montana Highway | | | — County Boundary |

Figure 9
Hazard Composite and Future Development
Cascade County, Montana
Multi-Hazard Mitigation Plan

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*Future Development data partially taken from Great Falls Growth Policy (2013).

Date: 4/21/2017



Legend

- Critical Facility
- ▲ Bridge
- Levee Critical Facility
- Interstate
- U.S. Highway
- Montana Highway
- Railroad

Figure 9A
Hazard Composite and Future Development
Great Falls, Montana
Multi-Hazard Mitigation Plan

Section 4: Risk Assessment and Vulnerability Analysis

Table 4.10-6. Future Development Summary

Proposed Project	Hazard Areas								
	Haz-Mat Incidents	Wildfire	Severe Weather & Drought	Communi- cable Disease	Transpor- tation Accident	Flooding	Dam Failure	Terrorism	Cyber Security
Great Falls – Residential Growth	14 of 20	15 of 20	Yes	Yes	Yes	1 of 20	5 of 20	Yes	Yes
Great Falls – Commercial Growth	6 of 8	5 of 8	Yes	Yes	Yes	No	1 of 8	Yes	Yes
Great Falls – Industrial Growth	Yes	Yes	Yes	Yes	Yes	No	1 of 3	Yes	Yes
Big Otter Wind Energy Project	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Mountain View Subdivision	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Industrial Subdivision	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Ranches at Belt Creek Subdivision	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Copper Basin Subdivision	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Larkspur Estates Subdivision	No	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Spring Tree Ridge South Subdivision	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Cottonwood Glen Subdivision	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

1

SECTION 5. MITIGATION STRATEGIES

This section presents mitigation actions for Cascade County, the City of Great Falls, and the Towns of Belt, Cascade and Neihart to reduce potential exposure and losses from natural, man-made, and technological hazards. The MHMP Planning Team reviewed the Risk Assessment to identify and develop the mitigation actions comprising the Cascade County mitigation strategy.

This section includes:

1. Background and Past Mitigation Accomplishments
2. General Mitigation Planning Approach
3. Mitigation Goals and Objectives
4. Capability Assessment
5. Mitigation Strategy Development

Hazard mitigation reduces the potential impacts of, and costs associated with, emergency and disaster-related events.

Mitigation actions address a range of impacts, including impacts on the population, property, the economy, and the environment.

Mitigation actions can include activities such as: revisions to land-use planning, training and education, and structural and nonstructural safety measures.

5.1 Background and Past Mitigation Accomplishments

In accordance with DMA 2000 requirements, a discussion regarding past mitigation activities and an overview of past efforts is provided as a foundation for understanding the mitigation goals, objectives, and activities outlined in this Plan. The County, through previous and ongoing hazard mitigation activities, has demonstrated that it is pro-active in protecting its physical assets and citizens against losses from natural hazards. Completed and ongoing projects since the 2011 PDM Plan was adopted include the following:

Hazardous Material Incidents

- Cascade County DES is continually updating its resource list of emergency response supplies/vendors.

Wildfire

- Fuel mitigation projects have been completed around Gore Hill, Fort Shaw, Monarch, and Neihart funded by the BLM's Community Assistance Fuel Mitigation Program and Secure Rural Schools Title III funds. Landowner fuel mitigation projects in the Monarch/Neihart area summarized in **Table 5.1-1**.

Table 5.1-1. Landowner Fuel Mitigation Accomplishments; Monarch & Neihart

Year(s)	Landowners	Acres Treated	Year(s)	Landowners	Acres Treated
2008-2010	-	153	2013	11	54
2011	1	5	2014	5	25
2012	10	48	2015	1	9
			TOTALS	28+	294

- The U.S. Forest Service undertook a hazardous fuels reduction project for 50 acres in the O'Brien Creek drainage. They also prepared the Little Belt Landscape Assessment which

provides an evaluation of the state of forest vegetation and with recommendations on where fuel treatments are needed.

- County Fire Departments have made visits to private residences in the WUI to raise consciousness on wildfire mitigation and promote participation in landowner defensible space projects.
- Television commercials and newspaper articles have been ongoing to recruit volunteer fire fighters.
- New 4-WD fire tenders have been obtained by the Sand Coulee, Simms, and Monarch fire departments.
- Fire departments receive incident command training to more effectively interface with incident management teams.
- A database of firefighting water sources is continually being worked on. The list for Gore Hill has been completed.
- County subdivision regulations have been updated and now include water supply requirements.

Severe Weather

- Two new schools and several additions have been built to include shatter-proof glass window upgrades.
- Cascade County DES has provided information to the public on the NWS Severe Weather Awareness program.
- The NWS has provided weather spotter training in Cascade County on an annual basis.
- The City of Great Falls subdivision regulations now require that power lines be buried to minimize interruption of service.
- The City of Great Falls has become a NWS Storm Ready Community.
- Snow removal services have been enhanced in Cascade County to support public safety and infrastructure protection.

Transportation Accidents

- Cascade County and the City of Great Falls continue exercises to prepare for mass casualty incidents.
- Cascade County and the City of Great Falls have an on-going recruitment and training program for EMS volunteers to staff the Quick Response Units.
- The County Commissioners and Belt Town Council have discussed a strategy to work with the railroad to reconstruct the underpass in Belt to create a wider and straighter alignment and are working with Sweet Grass Development for funding.
- Railroad crossing gates in Cascade County have been painted to enhance safety.
- Cascade County and the City of Great Falls support MDT's Transportation Safety Program and provide safety information to the public.

Flooding and Dam Failure

- The levee districts continue operation and maintenance activities to maintain certification of the West Great Falls and Vaughn levees.
- Brochures are available at the County and City Planning offices to educate homeowners on the NFIP and the advantages of purchasing flood insurance.

- Cascade County and the City of Great Falls are working towards achieving a lower rating through the NFIP Community Rating System (CRS). They had their 5-year review in 2016 and a CRS manual is due out in 2017.
- Cascade County provides information to the public on the NWS Flood Awareness Program.
- The Cascade County and City of Great Falls Planning offices provide information on their websites and consult with the property owners on flood mitigation techniques to reduce losses.
- Cascade County provides information to residents who live within the inundation areas of the high-hazard dams on evacuation.
- The West Great Falls Levee District spent \$55,000 over three seasons to remove woody debris from the edge of the levee.
- The Cascade County Conservation District has removed debris from floodways in the county.
- The West Great Falls Levee District has replaced aging security fencing along the levee and performs regular maintenance to enhance fencing.
- The City of Great Falls has constructed an upstream detention and bypass channel to reduce flooding in the Gibson Flats area.
- Cascade County and the City of Great Falls have installed larger culverts on Briggs Road, Collins Road (2), Fields Road, Gerber Road (2) and on Gibson Flats to enhance drainage and reduce flooding.
- The Town of Neihart has worked with the U.S. EPA on five locations where culverts are needed.
- New DFIRMs were produced for Cascade County and the City of Great Falls in 2013. The maps and floodplain ordinances were adopted by the jurisdictions.
- The sewer distribution system in Belt has been rehabilitated by running the line under Belt Creek which will enhance continuity of service during high water.

All Hazards

- Additional repeaters have been placed in the Sun River/Simms and Sand Coulee areas and a portable repeater has been obtained for the Neihart area to enhance radio communications.
- Locations for emergency shelters have been identified in the City of Great Falls and the balance of Cascade County.
- Meetings have been held with the North Central Independent Living Project to identify special needs residents and what they need during emergencies. The City-County Health Department has developed a Plan on this subject.
- Some progress has been made in providing NOAA weather radios to schools and critical facilities.
- Protocol has been established and a manual produced on addressing rural locations so people's residences can be found for rescue purposes. Emergency responders routinely identify residences without numbers and the County Public Works Dept. assigns numbers.
- Progress has been made in establishing a back-up location for the Dispatch Center. Possible locations have been identified and evaluated.
- Reverse 911 has been obtained for the county in the form of the Code Red program.
- A new cell tower has been installed in the town of Sun River to enhance communications.

- A generator has been obtained for the County's new Emergency Operations Center (EOC) to ensure continuity of operations.

5.2 General Mitigation Planning Approach

The overall approach used to update the Cascade County mitigation strategy was based on FEMA guidance regarding local mitigation plan development, including:

- DMA 2000 regulations, specifically 44 CFR 201.6 (local mitigation planning)
- FEMA "Local Mitigation Planning Handbook", March 2013
- FEMA "Integrating Hazard Mitigation into Local Planning", March 2013
- Identifying Mitigation Actions and Implementing Strategies (FEMA 386-3)
- FEMA "Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards", January 2013

The mitigation strategy approach includes the following steps that are further detailed in later sections of this Plan:

- Review and update mitigation goals and objectives.
- Identify mitigation capabilities, and evaluate their capacity and effectiveness to mitigate and manage hazard risk.
- Identify past and ongoing mitigation activities throughout the County.
- Identify appropriate county and local mitigation strategies to address the regions risk to natural and man-made hazards.
- Prepare an implementation strategy, including the prioritization of projects in the mitigation strategy.

5.3 Mitigation Goals and Objectives

This section documents the efforts to develop hazard mitigation goals and objectives established to reduce or avoid long-term vulnerabilities to the identified hazards.

According to CFR 201.6(c)(3)(i): "The hazard mitigation strategy shall include a description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards." For the purposes of this plan, goals are defined as follows:

Goals are general guidelines that explain what is to be achieved. They are usually broad, long-term, policy-type statements and represent global visions. Goals help define the benefits that the plan is trying to achieve. The success of the plan, once implemented, should be measured by the degree to which its goals have been met (that is, by the actual benefits in terms of hazard mitigation).

FEMA defines **Goals** as general guidelines that explain what should be achieved. Goals are usually broad, long-term, policy statements, and represent a global vision. FEMA defines **Objectives** as strategies or implementation steps to attain mitigation goals. Unlike goals, objectives are specific and measurable, where feasible. FEMA defines **Mitigation Actions** as specific actions that help to achieve the mitigation goals and objectives.

The 2011 Cascade County PDM Plan had nine goals; one goal specific to each of eight hazards (wildfire, structure fire, severe summer weather, hazardous material incidents, severe winter weather, transportation accidents, flooding and levee failure, and, dam failure), and one all-hazard

goal. For this 2017 MHMP Update, the Planning Team reviewed the mitigation goals and determined that there should be one goal for each hazard profiled in the Plan, and an all-hazard goal.

Mitigation objectives developed for the original PDM Plan were generally revised for this 2017 update. Where appropriate, mitigation objectives reflect FEMA’s “Local Mitigation Planning Handbook, March 2013” guidelines (see *Section 5.5.1*) as either: Public Education and Awareness, Property Protection, Prevention, Structural, Natural Resource Protection, or Emergency Services. Mitigation goals and objectives for the 2017 Plan are presented in **Table 5.3-1**.

5.4 Capability Assessment

The goals and objectives used to mitigate natural and technological hazards build on the community’s existing capabilities. Cascade County’s capabilities to support and implement mitigation projects include the programs and resources of various local, regional, state, and federal partners and the administrative and technical capabilities of County and city/town staff who implement the legal and regulatory requirements used to manage growth (zoning, building codes, subdivision regulations, and floodplain ordinances).

Cascade County’s hazard mitigation capabilities are summarized below. These resources have the responsibility to provide overview of past, current, and ongoing pre- and post-disaster mitigation projects including capital improvement programs, wildfire mitigation programs, stormwater management programs, and NFIP compliance projects. The fiscal capabilities of the County and city/towns to support hazard mitigation and provide the funding to implement the Cascade County mitigation strategy.

Table 5.3-1. Summary of Goals and Objectives

Goal #	Goal Statement	Objective #	2016 Goal/Objective Statement
1	Reduce the Impacts from Hazardous Material Incidents	1.1	Implement Prevention Projects to Reduce Impacts from Hazardous Material Incidents
		1.2	Enhance Emergency Service Capabilities to Reduce Impacts from Hazardous Material Incidents
		1.3	Implement Public Education and Awareness Projects to Reduce Impacts from Hazardous Material Incidents
2	Reduce Impacts from Wildfires	2.1	Implement Property Protection Projects to Reduce Impacts from Wildfire
		2.2	Implement Public Education and Awareness Projects to Reduce Impacts from Wildfire
		2.3	Enhance Emergency Service Capabilities to Reduce Impacts from Wildfire
		2.4	Support Mapping/Analysis/ Planning Projects to Reduce Impacts from Wildfire
3	Reduce the Impacts from Severe Weather & Drought	3.1	Implement Property Protection Projects to Reduce Impacts from Severe Weather
		3.2	Implement Public Education and Awareness Projects to Reduce Impacts from Severe Weather & Drought
		3.3	Implement Prevention Projects to Reduce Impacts from Severe Weather & Drought
4	Reduce Impacts from Communicable Disease	4.1	Implement Public Education and Awareness Projects to Reduce Impacts from Communicable Disease

Table 5.3-1. Summary of Goals and Objectives

Goal #	Goal Statement	Objective #	2016 Goal/Objective Statement
5	Reduce Impacts from Transportation Accidents	5.1	Enhance Emergency Service Capabilities to Reduce Impacts from Transportation Accidents
		5.2	Implement Structural Projects to Reduce Impacts from Transportation Accidents
		5.3	Implement Public Education and Awareness Projects to Reduce Impacts from Transportation Accidents
6	Reduce Impacts from Flooding and Dam Failure	6.1	Implement Prevention Projects to Reduce Impacts from Flooding and Dam Failure
		6.2	Implement Prevention Projects to Reduce Impacts from Flooding and Dam Failure
		6.3	Implement Property Protection Projects to Reduce Impacts from Flooding and Dam Failure
		6.4	Implement Structural Projects to Reduce Impacts from Flooding and Dam Failure
7	Reduce Impacts from Terrorism	7.1	Enhance Emergency Service Capabilities to Reduce Impacts from Terrorism
		7.2	Implement Property Protection Projects to Reduce Impacts from Terrorism
8	Enhance Cyber Security	8.1	Implement Property Protection Projects to Enhance Cyber Security
		8.2	Implement Public Education and Awareness Projects to Enhance Cyber Security
9	Reduce Impacts from All Hazards	9.1	Implement Prevention Projects to Reduce Impacts from All Hazards
		9.2	Enhance emergency service capabilities to mitigate impacts from all hazards
		9.3	Implement Public Education and Awareness Projects to Reduce Impacts from All Hazards

5.4.1 Summary of Programs and Resources Available to Support Mitigation

A number of programs and resources in Cascade County support mitigation efforts. These are described below.

National Flood Insurance Program

The NFIP is aimed at reducing the impact of flooding on private and public structures. This is achieved by providing affordable insurance for property owners and by encouraging communities to adopt and enforce floodplain management regulations. These efforts help mitigate the effects of flooding on new and improved structures. Overall, the program reduces the socio-economic impact of disasters by promoting the purchase and retention of Risk Insurance in general, and NFIP in particular.

NFIP Community Rating System

As an additional component of the NFIP, the Community Rating System is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. As a result, flood insurance premium rates are discounted to reflect the reduced flood risk resulting from the community actions meeting the three goals of the CRS: (1) reduce flood losses; (2) facilitate accurate insurance rating; and (3) promote the awareness of flood insurance.

5.4.2 Administrative and Technical Capabilities

Cascade County's administrative and technical capabilities to implement mitigation projects include community planners, engineers, floodplain managers, GIS personnel, emergency managers, and financial, legal and regulatory requirements. Expertise from local and regional planning partners also contribute to the County and City of Great Falls mitigation capabilities. Several of these entities are described below. The Towns of Belt, Cascade and Neihart rely on their town clerk's to administer the NFIP; otherwise, the towns rely on the County for mitigation support. **Table 5.4-1** summarizes the capabilities of the jurisdictions adopting this MHMP to accomplish hazard mitigation. *Section 3.7* provides additional discussion on many of these policies.

Table 5.4-1. Capability Assessment Summary

Capability	Cascade County	City of Great Falls	Town of Belt	Town of Cascade	Town of Neihart
Population (2015)	82,278	59,638	596	696	51
Policies and Programs					
Growth Policy that Supports Hazard Mitigation	Yes	Yes	No	Yes	Yes
Subdivision Regulations that Support Hazard Mitigation	Yes	Yes	No	No	No
Zoning that Recognizes Hazard Areas	Yes	Yes	No	No	No
National Flood Insurance Program Participation	Yes	Yes	Yes	Yes	Yes
Local Building Codes	No	Yes	No	No	No
Technical Capabilities					
Emergency Manager	Yes	Yes	No	No	No
Public Works Engineer	Yes	Yes	No	No	No
GIS Mapping Capabilities	Yes	Yes	No	No	No
Floodplain Administrator	Yes	Yes	Yes	Yes	Yes
Community Planners	Yes	Yes	Planning Board only	Planning Board only	No

Cascade County Disaster and Emergency Services / Great Falls Preparedness Program

The mission of Cascade County DES is to save lives, prevent injury, and protect property and the environment by taking reasonable and affordable measures to mitigate, prepare for, respond to and recover from disasters. The Cascade County DES Coordinator is responsible for the planning, coordination, and implementation of all emergency management and Homeland Security related activities for the county. Other responsibilities include coordination of activities for the county's Emergency Operations Center. The EOC, when activated, is a central location where representatives of local government and private sector agencies convene during disaster situations to make decisions, set priorities and coordinate resources for response and recovery. These efforts are designed to enhance the capacity of the local government to plan for, respond to, and mitigate the consequences of threats and disasters using an all-hazard framework.

The Cascade County DES office includes two full-time staff positions, the DES Coordinator, who devotes 100 percent of their time to emergency management and an administrative assistant, who devotes 25 percent of their time to emergency management. These positions are funded 50 percent

federal through the Emergency Management Performance Grant (EMPG) program and 50 percent through the County general fund. The City of Great Falls has an emergency manager whose position is funded 100 percent through City resources.

Local Emergency Planning Committee

The mission of the Cascade County LEPC is to provide resources and guidance to the community through education, coordination and assistance in hazmat planning; and to assure public health and safety. They do not function in actual emergency situations, but attempt to identify and catalogue potential hazards, identify available resources, and mitigate hazards when feasible. The LEPC consists of representatives from businesses, local government, emergency responders and citizen groups located in Cascade County. Monthly meetings are held at the DES office or new EOC in Great Falls.

Cascade County Planning Division and City of Great Falls Planning and Community Development Department

The Cascade County Planning Division is responsible for the administration and enforcement of the County's Subdivision Regulations, Zoning Regulations, Growth Policy, the State of Montana Subdivision and Platting Act, Floodplain Regulations, Location Conformance permits, and overall land use management for the County. The Planning Director oversees conflicts and questions regarding land use and land use relations and administration of the Planning Board. The Planning Board is responsible for development and administration of the Cascade County Development Plan that includes comprehensive planning and the permitting systems. The board advises the County Commission on all land use matters and develops and administers Subdivision and Floodplain Regulations.

The City of Great Falls Planning and Community Development Department plays a key role in shaping the future of urban development in Great Falls. The Planning and Building divisions help the community to develop guiding policies in the City's long range plans, and review new construction through zoning, building permits, subdivision regulations, and code enforcement. Flood protection and permitting are also handled by the Planning division.

Cascade County Fire Protection Services

The mission statement of the Cascade County and City of Great Falls Fire Departments is to provide the highest level of fire protection by means of prevention, suppression, and education. Divisions within the departments include: suppression, prevention, training, communications, and maintenance. Rural Cascade County has a volunteer fire protection system that is trained and equipped for fire protection. The County has been broken into 16 fire districts, with the fire stations located in the larger communities. Fire protection organizations providing fire services to Cascade County include Great Falls Fire/Rescue, Belt City Fire District (FD), and Neihart FD; Belt Rural Fire District (RFD); Fort Shaw Fire Service Area (FSA), Vaughn FSA, Black Eagle FSA, Cascade FSA, Gore Hill FSA, Monarch FSA, Sand Coulee FSA, Stockett FSA, Sun River FSA, Ulm FSA, Simms FSA, Dearborn FSA, Cascade Farmer/Rancher FSA; Montana DNRC; Lewis and Clark National Forest; and Bureau of Land Management. The Montana Air National Guard has a fire department located at the Great Falls International Airport and the Malmstrom Air Force Base has a fire department located at the Air

Force Base in Great Falls. The City of Great Falls provides fire and emergency medical services to the County Fire Districts.

The local fire departments also work in coordination with the Cascade County Rural Fire Council.

The Rural Fire Council consists of the 16 volunteer fire departments, and provides information and advice to the County and City Commissioners on matters relating to fire and life safety services within Cascade County. The council also provides a forum for operational discussion and collaboration among the members, enhances communications among operational units, and provides for the common good. Written mutual aid agreements have been signed among and between all fire districts or departments in Cascade County, as well as with adjoining counties, and similar agreements have been reached with state and federal fire control agencies.

Montana DNRC and Federal Land Management Agencies

The Forestry Division, of the Montana DNRC is responsible for planning and implementing forestry and fire management programs through an extensive network of staff located in field offices across the state. The Fire and Aviation Management Bureau provides resources, leadership and coordination to Montana's wildland fire services to protect lives, property, and natural resources; working with local, tribal, state, and federal partners to ensure wildfire protection on all state and private land in Montana. There are numerous programs aimed at effective fire preparedness and capacity building. The Fire Preparedness effort is focused in four areas:

- Fire Prevention Program seeks to educate Montanans about fire risk, the wildland urban interface and reducing human-caused fires;
- Fire Training Program provides statewide training opportunities for DNRC and local government personnel;
- Equipment Development Center builds and maintains wildland fire equipment and radio communications;
- Fire Support Programs provide financial and technical expertise to assist all fire programs in meeting their respective goals and mandates. These include, but not limited to: Fire Assessment fees, GIS, repair and maintenance of radio systems and rolling stock equipment.

The U.S. Forest Service is involved in planning activities for public land area within Cascade County.

FireSafe Montana

FireSafe Montana is a private, non-profit organization coordinating and supporting a statewide coalition of diverse interests working together to help Montanans make their homes, neighborhoods, and communities fire safe. FireSafe Montana actively encourages and assists in the development of local FireSafe councils across the state. These councils are key to raising public awareness of local wildland fire threats and issues, motivating residents to take positive action, and providing access to the expertise and resources homeowners need to get the job done. When people take personal responsibility for applying and maintaining Firewise practices on their property, they greatly increase the chances of their homes surviving a wildfire.

Through its public information programs and materials, website, newsletter, and special events, as well as its active involvement in federal, state, and local fire mitigation efforts, FireSafe Montana is working hard to reduce the potential loss of life and property from wildfire in Montana.

National Fire Prevention Association's (NFPA) FireWise Communities Program

NFPA's Firewise Communities Program encourages local solutions for safety by involving homeowners in taking individual responsibility for preparing their homes from the risk of wildfire. Firewise is a key component of Fire Adapted Communities – a collaborative approach that connects all those who play a role in wildfire education, planning and action with comprehensive resources to help reduce risk. The program is co-sponsored by the U.S. Forest Service, the U.S. Department of the Interior, and the National Association of State Foresters. To save lives and property from wildfire, NFPA's Firewise Communities program teaches people how to adapt to living with wildfire and encourages neighbors to work together and take action now to prevent losses. They advocate playing a role in protecting ourselves and each other from the risk of wildfire.

NOAA Weather-Ready Nation Program

The Weather-Ready Nation (WRN) Ambassador initiative is NOAA's effort to formally recognize NOAA partners who are improving the nation's readiness, responsiveness, and overall resilience against extreme weather, water, and climate events. As a WRN Ambassador, partners commit to working with NOAA and other Ambassadors to strengthen national resilience against extreme weather. In effect, the WRN Ambassador initiative helps unify the efforts across government, non-profits, academia, and private industry toward making the nation more ready, responsive, and resilient against extreme environmental hazards. WRN is a strategic outcome where society's response should be equal to the risk from all extreme weather, water, and climate hazards.

WRN Ambassadors serve a pivotal role in affecting societal change — helping to build a nation that is ready, responsive, and resilient to the impacts of extreme weather and water events.

To be officially recognized as a WRN Ambassador, an organization must commit to:

- Promoting Weather-Ready Nation messages and themes to their stakeholders;
- Engaging with NOAA personnel on potential collaboration opportunities;
- Sharing their success stories of preparedness and resiliency; and,
- Serving as an example by educating employees on workplace preparedness.

5.4.3 Fiscal Capabilities

Mitigation projects and initiatives are largely or entirely dependent on available funding. Cascade County is able to fund mitigation projects through existing local budgets, local appropriations (including referendums and bonding), and through a myriad of Federal and State loan and grant programs. A number of these funding opportunities are described below.

FEMA Hazard Mitigation Funding Opportunities

Federal mitigation grant funding is available to all communities with a current hazard mitigation plan (this plan); however most of these grants require a "local share" in the range of 10-25 percent of the total grant amount. The FEMA mitigation grant programs are described below.

FEMA, Hazard Mitigation Grant Program (HMGP). The HMGP is a post-disaster mitigation program. It is made available to states by FEMA after each Federal disaster declaration. The HMGP can provide up to 75 percent funding for hazard mitigation measures. The HMGP can be used to fund cost-effective projects that will protect public or private property in an area covered by a federal disaster

declaration or that will reduce the likely damage from future disasters. Examples of projects include acquisition and demolition of structures in hazard prone areas, flood-proofing or elevation to reduce future damage, minor structural improvements and development of state or local standards. Projects must fit into an overall mitigation strategy for the area identified as part of a local planning effort. All applicants must have a FEMA-approved Hazard Mitigation Plan (this plan).

Applicants who are eligible for the HMGP are state and local governments, certain nonprofit organizations or institutions that perform essential government services, and Indian tribes and authorized tribal organizations. Individuals or homeowners cannot apply directly for the HMGP; a local government must apply on their behalf. Applications are submitted to Montana DES and placed in rank order for available funding and submitted to FEMA for final approval. Eligible projects not selected for funding are placed in an inactive status and may be considered as additional HMGP funding becomes available.

Flood Mitigation Assistance (FMA) Program. The FMA combines the previous Repetitive Flood Claims and Severe Repetitive Loss Grants into one grant program. FMA provides funding to assist states and communities in implementing measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the NFIP. The FMA is funded annually; no federal disaster declaration is required. Only NFIP insured homes and businesses are eligible for mitigation in this program. Funding for FMA is very limited and, as with the HMGP, individuals cannot apply directly for the program. Applications must come from local governments or other eligible organizations. The federal cost share for an FMA project is 75 percent. At least 25 percent of the total eligible costs must be provided by a non-federal source. Of this 25 percent, no more than half can be provided as in-kind contributions from third parties. At minimum, a FEMA-approved local flood mitigation plan is required before a project can be approved. FMA funds are distributed from FEMA to the state. Montana DES serves as the grantee and program administrator for FMA.

FEMA, Pre-Disaster Mitigation Competitive (PDMC) Grant Program. The PDM program is an annually funded, nationwide, competitive grant program. No disaster declaration is required. Federal funds will cover 75 percent of a project's cost up to \$3 million. As with the HMGP and FMA, a FEMA-approved local Hazard Mitigation Plan is required to be approved for funding under the PDM program.

FEMA, Readiness, Response and Recovery Directorate, Fire Management Assistance Grant Program. This program provides grants to states, tribal governments and local governments for the mitigation, management and control of any fire burning on publicly (non-federal) or privately owned forest or grassland that threatens such destruction as would constitute a major disaster. The grants are made in the form of cost sharing with the federal share being 75 percent of total eligible costs. Grant approvals are made within 1 to 72 hours from time of request.

Fire Prevention and Safety Grants. The Fire Prevention and Safety Grants (FP&S) are part of the Assistance to Firefighters Grants, and are administered by the FEMA. FP&S Grants support projects that enhance the safety of the public and firefighters from fire and related hazards. The primary goal is to target high-risk populations and reduce injury and prevent death. Eligibility includes fire departments, national, regional, state, and local organizations, Native American tribal organizations, and/or community organizations recognized for their experience and expertise in fire prevention

and safety programs and activities. Private non-profit and public organizations are also eligible. Interested applicants are advised to check the website periodically for announcements of grant availability. More information: <https://www.fema.gov/welcome-assistance-firefighters-grant-program>

Other Mitigation Funding Opportunities

Grant funding is available from a variety of federal and state agencies for training, equipment, and hazard mitigation activities. Several of these programs are described below.

Program 15.228: Wildland Urban Interface Community and Rural Fire Assistance. This program is designed to implement the National Fire Plan and assist communities at risk from catastrophic wildland fires. The program provides grants, technical assistance, and training for community programs that develop local capability, including: Assessment and planning, mitigation activities, and community and homeowner education and action; hazardous fuels reduction activities, including the training, monitoring or maintenance associated with such hazardous fuels reduction activities, on federal land, or on adjacent nonfederal land for activities that mitigate the threat of catastrophic fire to communities and natural resources in high risk areas; and, enhancement of knowledge and fire protection capability of rural fire districts through assistance in education and training, protective clothing and equipment purchase, and mitigation methods on a cost share basis. More information: <http://www.federalgrantswire.com/wildland-urban-interface-community-and-rural-fire-assistance.html#.WCx8ekYzWUk>

Secure Rural Schools and Community Self-Determination Act - Title III- County Funds. The Self-Determination Act has recently been reauthorized and now includes specific language regarding the Firewise Communities program. Counties seeking funding under Title III must use the funds to perform work under the Firewise Communities program. Counties applying for Title III funds to implement Firewise activities can assist in all aspects of a community's recognition process, including conducting or assisting with community assessments, helping the community create an action plan, assisting with an annual Firewise Day, assisting with local wildfire mitigation projects, and communicating with the state liaison and the national program to ensure a smooth application process. Counties that previously used Title III funds for other wildfire preparation activities such as the Fire Safe Councils or similar would be able to carry out many of the same activities as they had before. However, with the new language, counties would be required to show that funds used for these activities were carried out under the Firewise Communities program. More information: http://www.fs.usda.gov/wps/portal/fsinternet!/ut/p/c4/04_SB8K8xLLM9MSSzPy8xBz9CP0os3giAwhwtDDw9_Al8zPwhQoY6BdkOyoCAPkATIA!/?ss=119985&navtype=BROWSEBYSUBJECT&cid=FS003853&navid=0910000000000000&pnavid=null&position=BROWSEBYSUBJECT&ttype=main&pname=Secure%20Rural%20Schools-%20Home

U.S. Fish & Wildlife Service, Rural Fire Assistance Grants. Each year, the U.S. Fish & Wildlife Service (FWS) provides Rural Fire Assistance (RFA) grants to neighboring community fire departments to enhance local wildfire protection, purchase equipment, and train volunteer firefighters. Service fire staff also assist directly with community projects. These efforts reduce the risk to human life and better permit FWS firefighters to interact and work with community fire organizations when fighting wildfires. The Department of the Interior (DOI) receives an appropriated budget each year for an RFA grant program. The maximum award per grant is \$20,000. The DOI assistance program targets rural

and volunteer fire departments that routinely help fight fire on or near DOI lands. More information: http://www.fws.gov/fire/living_with_fire/rural_fire_assistance.shtml

U.S. Bureau of Land Management (BLM), Community Assistance Program. BLM provides funds to communities through assistance agreements to complete mitigation projects, education and planning within the WUI. More information:

http://www.blm.gov/nifc/st/en/prog/fire/community_assistance.html

Fire Management Assistance Program. This program is authorized under Section 420 of the Stafford Act. It allows for the mitigation, management, and control of fires burning on publicly or privately owned forest or grasslands that threaten destruction that would constitute a major disaster. More information: <http://www.fema.gov/fire-management-assistance-grant-program>

U.S. Department of Agriculture, Community Facilities Loans and Grants. Provides grants (and loans) to cities, counties, states and other public entities to improve community facilities for essential services to rural residents. Projects can include fire and rescue services; funds have been provided to purchase fire-fighting equipment for rural areas. No match is required. More information: http://www.usda.gov/wps/portal/usda/usdahome?navid=GRANTS_LOANS

General Services Administration, Sale of Federal Surplus Personal Property. This program sells property no longer needed by the federal government. The program provides individuals, businesses and organizations the opportunity to enter competitive bids for purchase of a wide variety of personal property and equipment. Normally, there are no restrictions on the property purchased. More information: <http://www.gsa.gov/portal/category/21045>

Hazardous Materials Emergency Preparedness Grants. Grant funds are passed through to local emergency management offices and HazMat teams having functional and active LEPC groups. More information: <http://www.phmsa.dot.gov/hazmat/grants>

U.S. Department of Homeland Security. Enhances the ability of states, local and tribal jurisdictions, and other regional authorities in the preparation, prevention, and response to terrorist attacks and other disasters, by distributing grant funds. Localities can use grants for planning, equipment, training and exercise needs. These grants include, but are not limited to areas of Critical Infrastructure Protection Equipment and Training for First Responders, and Homeland Security Grants. More information: <http://www.dhs.gov/>

Community Development Block Grants (CDBG). The U.S. Department of Commerce administers the CDBG program which are intended to provide low and moderate-income households with viable communities, including decent housing, a suitable living environment, and expanded economic opportunities. Eligible activities include community facilities and improvements, roads and infrastructure, housing rehabilitation and preservation, development activities, public services, economic development, planning, and administration. Public improvements may include flood and drainage improvements. In limited instances, and during the times of “urgent need” (e.g. post disaster) as defined by the CDBG National Objectives, CDBG funding may be used to acquire a property located in a floodplain that was severely damaged by a recent flood, demolish a structure severely damaged by an earthquake, or repair a public facility severely damaged by a hazard event. CDBG funds can be used to match FEMA grants. More Information: <http://www.hud.gov/offices/cpd/communitydevelopment/programs/>

Volunteer Fire Assistance Program Grants. The purpose of these grants is to organize, train and equip local firefighters to prevent and suppress wildfires. Communities under 10,000 in population are eligible for the funding. Smaller communities may join together in a group and or county effort to submit an application, even if their combined population is over 10,000. There is no pre-set award amount. Financial assistance on any project, during any fiscal year, requires a non-federal match for project expenditures. More information: <http://dnrc.mt.gov/grants-and-loans>

Conservation District Grants. This program provide funds to increase conservation district employee's hours to assist in planning, securing funding, and implementing programs that improve public outreach, improve conservation district administrative capabilities, and implement conservation plans. There is a \$10,000 award amount. More information: <http://dnrc.mt.gov/grants-and-loans>

Western States Wildland Urban Interface. National Fire Plan funds are available to mitigate risk from wildland fire within the WUI. Funds are awarded through a competitive process to 22 western states and territories through the Western Wildland Urban Interface Grant Program. Each year, the Montana Department of Natural Resources and Conservation accepts proposals from partners around the state for submission to the National Fire Plan competitive process. The State scores and prioritizes these proposals before sending them on to the national competitive process. Non-profit organizations, conservation districts, county and municipal governments, and fire departments. Individual landowners may not apply but may be eligible for cost-share opportunities through this program. Each grant request is limited to a maximum of \$300,000. More information: <http://dnrc.mt.gov/grants-and-loans>

Hazardous Fuel Reduction Grants. These grants are for hazardous fuel reduction on private lands to protect communities adjacent to National Forest System Lands where prescribed fire activities are planned. Prescribed fire activities must be imminent (to take place within 3 years of the award). Non-profit organizations, conservation districts, county and municipal governments, fire departments are eligible for this funding. Award amounts typically range from \$50,000 to \$100,000 depending upon availability of funding. More information: <http://dnrc.mt.gov/grants-and-loans>

Renewable Resource Grant Program. Administered by the Montana DNRC, this program provides both grant and loan funding for public facility and other renewable resource projects. Projects that conserve, manage, develop or protect Montana's renewable resources are eligible for funding. Numerous public facility projects including drinking water, wastewater and solid waste development and improvement projects have received funding through this program. Other projects that have been funded include irrigation rehabilitation, dam repair, soil and water conservation and forest enhancement. More information: <http://dnrc.mt.gov/grants-and-loans>

5.5 Mitigation Strategy Development

This subsection discusses the identification, prioritization, analysis and implementation plan of mitigation actions for Cascade County, the City of Great Falls and the Towns of Belt, Cascade and Neihart.

5.5.1 Mitigation Strategy Update and Reconciliation

The Planning Team reviewed the list of mitigation actions (projects) from the 2011 PDM Plan and determined which were complete, should be deleted, or reworded for the 2017 mitigation strategy during Planning Team conference calls held during February and March, 2017. **Appendix C** presents a reconciliation of mitigation projects and their status.

Concerted efforts were made to assure that the county develop mitigation strategies that included activities and initiatives covering the range of mitigation action types described in recent FEMA planning guidance (FEMA “Local Mitigation Planning Handbook” March 2013), specifically:

- Prevention Projects – These actions include governmental regulatory authorities, including policies or codes that influence the way land and buildings are being developed and built.
- Property Protection Projects – Actions that involve the modification of existing buildings or structures to protect them from a hazard, or removal from the hazard area. Examples include acquisition, elevation, relocations, structural retrofits, storm shutters, and shatter-resistant glass.
- Structural Projects - These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.
- Natural Resource Protection Projects – These are actions that minimize damage and losses, and also preserve or restore the functions of natural systems.
- Education and Awareness Programs – These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as the National Flood Insurance Program and Community Rating System, StormReady (NOAA) and Firewise (NFPA) Communities.
- Emergency Service Projects – These are actions to enhance community preparedness through training and acquisition of equipment.
- Mapping/Analysis/Planning Projects – These actions include development of mapping and planning documents to assist with implementation of mitigation strategies.

In consideration of federal and state mitigation guidance, the MHMP Planning Team recognized that all communities would benefit from the inclusion of certain mitigation actions. These include initiatives to address vulnerable public and private properties, including repetitive loss properties; initiatives to support continued and enhanced participation in the NFIP; improved public education and awareness programs; and initiatives to support countywide and regional efforts to build greater local mitigation capabilities.

Mitigation actions included in the 2017 Cascade County mitigation strategy are presented in **Table 5.5-2** at the end of this Section. **Appendix D** contains a mitigation action plan with individual project worksheets.

5.5.2 Mitigation Strategy Benefit/Cost Review and Prioritization

Each of the proposed mitigation actions has value; however, time and financial constraints do not permit all projects to be implemented immediately. By prioritizing the actions, the most critical, cost effective projects can be achieved in the short term. Mitigation actions retained and developed for this updated MHMP were re-prioritized to reflect current conditions and anticipated needs over the next five years.

Section 201.6.c.3iii of 44CFR requires the prioritization of the action plan to emphasize the extent to which benefits are maximized according to a cost/benefit review of the proposed projects and their associated costs. Stated otherwise, cost-effectiveness is one of the criteria that must be applied during the evaluation and prioritization of all actions comprising the overall mitigation strategy.

The benefit/cost review used for the evaluation and prioritization of projects in this plan was qualitative; i.e. it does not include the level of detail required by FEMA for project grant eligibility under the HMGP and PDMC grant program.

- **Costs** are the total cost for the action or project, and may include administrative costs, construction costs (including engineering, design and permitting), and maintenance costs.
- **Benefits** are the savings from losses avoided attributed to the implementation of the project, and may include life-safety, structure and infrastructure damages, loss of service or function, and economic and environmental damage and losses.

When available, jurisdictions were asked to identify the actual or estimated dollar value for project costs and associated benefits. Having defined costs and benefits allows a direct comparison of benefits versus costs, and a quantitative evaluation of project cost-effectiveness. Often, however, numerical costs and/or benefits have not been identified, or may be impossible to quantitatively assess.

For the purposes of this planning process, a cost-benefit matrix was developed to rank the mitigation projects using the following criteria. Each project was assigned a “high”, “medium”, or “low” rank for *Population Impacted*, *Property Impacted*, *Project Feasibility* and *Cost*, as described below:

- For the *Population Protected* category, a “high” rank represents greater than 50 percent of County residents would be protected by implementation of the mitigation strategy; a “medium” rank represents 20 to 50 percent of County residents would be protected; and, a “low” rank represents less than 20 percent of County residents would be protected.
- For the *Property Protected* category, a “high” represents that greater than \$500,000 worth of property would be protected through implementation of the mitigation strategy; “medium” represents that \$100,000 to \$500,000 worth of property would be protected; and, “low” would be less than \$100,000 would be protected.
- For the *Project Feasibility* category a “high” rank represents that technology is available and implementation is likely; a “medium” rank indicates technology may be available but implementation could be difficult; and, a “low” rank represents that no technology is available or implementation would be unlikely.

- For the *Project Cost* category, a “high” represents that the mitigation project would cost more than \$500,000; a “medium” rank represents the project cost would be between \$100,000 and \$500,000; and, “low” represents the project would cost less than \$100,000.

The overall cost-benefit was then calculated by summing the total score for each project. **Table 5.5-1** presents the cost-benefit scoring matrix. The mitigation action plans in **Appendix D** present the scoring of each project.

Table 5.5-1. Cost-Benefit Scoring Matrix

Score	Population Protected	Property Protected	Project Feasibility	Cost
High	3	3	3	1
Medium	2	2	2	2
Low	1	1	1	3

After considering all mitigation projects, the MHMP Planning Team prioritized the projects as high, medium, or low based on which projects were most needed to protect life and property. Prioritization of the projects serves as a guide for choosing and funding projects. **Table 5.5-2** presents the County priority for each project.

5.5.3 Project Implementation

The MHMP Planning Team reviewed the projects and assigned a corresponding county, city or town department responsible for its implementation. Cooperating organizations for implementation may also include local, federal or regional agencies that are capable of implementing activities and programs. The Planning Team identified a schedule for implementation and potential funding sources. The schedule for implementation included several categories including: “ongoing” for projects that are part of the County’s emergency management program; “short-term” for projects to be completed within 1-2 years; “mid-term” for projects to be completed within 3-4 years; “long-term” for projects to be completed in 5 or more years; and “Year 1-5” for projects which will span the entire planning period.

Implementation details are shown in **Table 5.5-3** and in the mitigation action plans in **Appendix D**. The Cascade County DES Coordinator will be responsible for mitigation project administration.

Table 5.5-2. Cascade County 2017 Mitigation Strategy

Goal	Objective	Project	Hazard	Jurisdiction	Benefit-Cost Ranking/Score	County Priority
Goal 1 - Reduce the Impacts from Hazardous Material Incidents	Objective 1.1 - Implement Prevention Projects to Reduce Impacts from Hazardous Material Incidents	Project 1.1.1 - Explore the possibility of a signed hazardous material route around Great Falls to avoid population center.	Hazardous Material Incidents	GF	High / 11	Medium
	Objective 1.2 - Enhance Emergency Service Capabilities to Reduce Impacts from Hazardous Material Incidents	Project 1.2.1 - Ensure local emergency responders have adequate training to respond to haz-mat events consistent with local capabilities.	Hazardous Material Incidents	CC, GF, B, C, N	High / 12	High
		Project 1.2.2 - Obtain regional containment equipment trailers and supplies to strategically position for response in the county.	Hazardous Material Incidents	CC, GF, B, C, N	High / 11	Medium
		Project 1.2.3 - Update resource list of emergency response supplies/vendors.	Hazardous Material Incidents	CC, GF, B, C, N	Medium / 8	High
	Objective 1.3 - Implement Public Education and Awareness Projects to Reduce Impacts from Hazardous Material Incidents	Project 1.3.1 - Increase public awareness of common hazardous materials either stored, used or transported through the area.	Hazardous Material Incidents	CC, GF, B, C, N	High / 10	High
		Project 1.3.2 - Educate teachers and school staff in schools near hazardous materials facilities and transportation routes in how to limit exposure to hazardous materials to students during an incident.	Hazardous Material Incidents	CC, GF, B, C, N	Medium / 8	High
		Project 1.3.3 - Evaluate opportunities to inform private property owners who live along state highways on hazardous-material traffic.	Hazardous Material Incidents	CC, GF, B, C, N	Medium / 7	High
Goal 2 - Reduce Impacts from Wildfire	Objective 2.1 - Implement Property Protection Projects to Reduce Impacts from Wildfire	Project 2.1.1 - Continue grants programs for landowners to create defensible space.	Wildfire	CC	High / 10	High
	Objective 2.2 - Implement Public Education and Awareness Projects to Reduce Impacts from Wildfire	Project 2.2.1 - Continue education programs to raise consciousness of landowners on wildfire.	Wildfire	CC, GF, B, C, N	High / 10	High
	Objective 2.3 - Enhance Emergency Service Capabilities to Reduce Impacts from Wildfire	Project 2.3.1 - Recruit and train volunteer firefighters.	Wildfire	CC, GF, B, C, N	High / 11	High

Table 5.5-2. Cascade County 2017 Mitigation Strategy

Goal	Objective	Project	Hazard	Jurisdiction	Benefit-Cost Ranking/Score	County Priority
Goal 2 - Reduce Impacts from Wildfire	Objective 2.3 - Enhance Emergency Service Capabilities to Reduce Impacts from Wildfire	Project 2.3.2 - Obtain more 4-WD tenders.	Wildfire	CC	Medium / 8	High
		Project 2.3.3 - Install culverts on initial attack roads in Dearborn area.	Wildfire	CC	Medium / 9	High
		Project 2.3.4 - Improve training and qualifications of personnel to more effectively interface with incoming Incident Management Teams deployed in the county.	Wildfire	CC, GF, B, C, N	High / 10	Med8um
		Project 2.3.5 - Increase availability of water resources for wildland firefighting by strategic placement of water tanks and ponds.	Wildfire	CC, GF, B, C, N	Medium / 9	Low
		Project 2.3.6 - Create a database of water sources for firefighting and make database available to rural fire districts.	Wildfire	CC, B, C, N	High / 10	Medium
		Project 2.3.7 - Perform fuel treatments along evacuation routes.	Wildfire	CC	Medium / 8	High
	Objective 2.4 - Support Mapping/Analysis/ Planning Projects to Reduce Impacts from Wildfire	Project 2.4.1 - Study creation of fire breaks in appropriate locations in Conservation Reserve Program lands and areas of future development.	Wildfire	CC	High / 10	Medium
		Project 2.4.2 - Conduct WUI mapping to support new Community Wildfire Protection Plan.	Wildfire	CC, GF, B, C, N	Medium / 8	High
		Project 2.4.3 - Update Community Wildfire Protection Plan.	Wildfire	CC, GF, B, C, N	Medium / 9	High
		Project 2.4.4 - Complete a study of impact fees for rural residents to fund more reliable water supplies and fire safety.	Wildfire	CC	Medium / 7	Medium
Goal 3 - Reduce the Impacts from Severe Weather & Drought	Objective 3.1 - Implement Property Protection Projects to Reduce Impacts from Severe Weather	Project 3.1.1 - Install windows with shatterproof glass at new schools and critical facilities and upgrade windows at existing facilities during regular maintenance.	Severe Weather	CC, GF, B, C, N	High / 10	Low
	Objective 3.2 - Implement Public Education and Awareness Projects to Reduce Impacts from Severe Weather & Drought	Project 3.2.1 - Promote National Weather Service's severe weather spotter training program.	Severe Weather	CC, GF, B, C, N	Medium / 8	High

Table 5.5-2. Cascade County 2017 Mitigation Strategy

Goal	Objective	Project	Hazard	Jurisdiction	Benefit-Cost Ranking/Score	County Priority
Goal 3 - Reduce the Impacts from Severe Weather & Drought	Objective 3.2 - Implement Public Education and Awareness Projects to Reduce Impacts from Severe Weather & Drought	Project 3.2.2 - Promote National Weather Service's severe weather spotter training program.	Drought	CC, GF, B, C, N	Medium / 8	High
		Project 3.2.3 - Support drought programs implemented through the Conservation District, FSA, and MSU extension.	Drought	CC, GF, B, C, N	Medium / 8	Medium
		Project 3.2.4 - Implement projects from Conservation District's drought planning process.	Drought	CC, GF, B, C, N	Medium / 7	Medium
	Objective 3.3 - Implement Prevention Projects to Reduce Impacts from Severe Weather & Drought	Project 3.3.1 - Encourage utility companies to bury power lines where interruption of service is frequent.	Drought	CC, GF, B, C, N	Medium / 7	Medium
Goal 4 - Reduce Impacts from Communicable Disease	Objective 4.1 - Implement Public Education and Awareness Projects to Reduce Impacts from Communicable Disease	Project 4.1.1 - Support Public Health Department's public education programs on communicable disease.	Communicable Disease	CC, GF, B, C, N	High / 10	High
		Project 4.1.2 - Promote immunizations and disseminate information.	Communicable Disease	CC, GF, B, C, N	Medium / 9	High
		Project 4.1.3 - Promote active surveillance between Public Health and healthcare providers.	Communicable Disease	CC, GF, B, C, N	High / 10	High
Goal 5 - Reduce Impacts from Transportation Accidents	Objective 5.1 - Enhance Emergency Service Capabilities to Reduce Impacts from Transportation Accidents	Project 5.1.1 - Continue exercises to prepare for mass casualty incidents.	Transportation Accidents	CC, GF, B, C, N	High / 10	High
		Project 5.1.2 - Recruit and train EMS volunteers to staff Quick Response Units.	Transportation Accidents	CC, GF, B, C, N	High / 10	High
	Objective 5.2 - Implement Structural Projects to Reduce Impacts from Transportation Accidents	Project 5.2.1 - Work with railroad to reconstruct Belt underpass to create a wider and straighter alignment.	Transportation Accidents	B	Low / 5	Medium
		Project 5.2.2 - Encourage railroads to enhance safety at crossings.	Transportation Accidents	CC, GF, B, C	Medium / 9	Medium-Low
Goal 5 - Reduce Impacts from Transportation Accidents	Objective 5.3 - Implement Public Education and Awareness Projects to Reduce Impacts from Transportation Accidents	Project 5.3.1 - Support MDT's Transportation Safety Program.	Transportation Accidents	CC, GF, B, C, N	High / 10	Medium

Table 5.5-2. Cascade County 2017 Mitigation Strategy

Goal	Objective	Project	Hazard	Jurisdiction	Benefit-Cost Ranking/Score	County Priority
Goal 6 - Reduce Impacts from Flooding and Dam Failure	Objective 6.1 - Implement Prevention Projects to Reduce Impacts from Flooding and Dam Failure	Project 6.1.1 - Re-certify the West Great Falls and Vaughn levees.	Flooding	CC, GF	Medium / 7	High
	Objective 6.2 - Implement Public Education and Awareness Projects to Reduce Impacts from Flooding and Dam Failure	Project 6.2.1 - Educate homeowners on the advantages of purchasing flood insurance through the National Flood Insurance Program.	Flooding	CC, GF, B, C, N	High / 10	Medium
		Project 6.2.2 - Work towards achieving a lower rating through the National Flood Insurance Program Community Rating System.	Flooding	CC, GF, B, C, N	Medium / 9	Medium
		Project 6.2.3 - Participate in the National Weather Service's Flood Awareness program.	Flooding	CC, GF, B, C, N	High / 10	High
		Project 6.2.4 - Provide awareness training to repetitive loss property owners (and others) on mitigation programs to relocate, elevate, and floodproof structures in the floodplain.	Flooding	CC, GF, B, C, N	High / 10	High
		Project 6.2.5 - Conduct public outreach / education with residents living in inundation areas.	Dam Failure	CC, GF, C	High / 11	Medium
	Objective 6.3 - Implement Property Protection Projects to Reduce Impacts from Flooding and Dam Failure	Project 6.3.1 - Obtain river gauges for 6th Street SW bridge in Great Falls, in the town of Sun River, and elsewhere as needed.	Flooding	CC, GF	High / 10	High
		Project 6.3.2 - As needed, remove woody vegetation from the edge of the county's levee and dikes.	Flooding	CC, GF, B	Medium / 9	Medium
		Project 6.3.3 - Remove debris from floodways.	Flooding	CC, GF, B, C, N	Medium / 9	High
		Project 6.3.4 - Install and maintain security fencing and signage on levees and dikes in the county.	Flooding	CC, GF, B	Medium / 8	High
		Project 6.3.5 - Consider forming a flood control district in Belt to address concerns with the dike.	Flooding	B	Medium / 9	Medium
	Objective 6.4 - Implement Structural Projects to Reduce Impacts from Flooding and Dam Failure	Project 6.4.1 - Reduce flooding in the Gibson Flats area by installing drainage ditches in the vicinity of Gerber Road.	Flooding	CC	Medium / 9	Low
		Project 6.4.2 - Resize culverts in various locations throughout the county.	Flooding	CC, GF, B, C, N	High / 10	Medium

Table 5.5-2. Cascade County 2017 Mitigation Strategy

Goal	Objective	Project	Hazard	Jurisdiction	Benefit-Cost Ranking/Score	County Priority
Goal 6 - Reduce Impacts from Flooding and Dam Failure	Objective 6.4 - Implement Structural Projects to Reduce Impacts from Flooding and Dam Failure	Project 6.4.3 - Identify locations in Neihart where culverts are needed.	Flooding	N	High / 10	High
		Project 6.4.4 - Redesign the storm drain system in Belt.	Flooding	B	Medium / 7	Low
		Project 6.4.5 - Construct a dike on the west side of the town of Sun River	Flooding	CC	Medium / 8	Low
		Project 6.4.6 - Protect riverside berms along the Sun River to prevent erosion.	Flooding	CC	Medium / 9	Medium
		Project 6.4.7 - Evaluate the outlets on West Great Falls levee for improvements in stormwater drainage	Flooding	GF	High / 10	Low
		Project 6.4.8 - Update the storm water system in the Town of Cascade	Flooding	C	Medium / 7	Medium
Goal 7 - Reduce Impacts from Terrorism	Objective 7.1 - Enhance Emergency Service Capabilities to Reduce Impacts from Terrorism	Project 7.1.1 - Conduct comprehensive vulnerability assessment that provides priorities.	Terrorism	CC, GF	High / 10	High
		Project 7.1.2 - Prioritize active shooter/armed intruder response training for employees of critical facilities.	Terrorism	CC, GF	High / 10	Medium
	Objective 7.2- Implement Property Protection Projects to Reduce Impacts from Terrorism	Project 7.2.1 - Consider installing video surveillance or alarms in critical facilities, especially in unattended locations (i.e. – water towers/communication sites/power or water sub-stations).	Terrorism	CC, GF	Medium / 9	Medium
		Project 7.2.2 - Consider physical hardening of critical facilities (i.e. anti-vehicle barricades / interior barricades for locking doors [door kicks, door stops] / perimeter fencing / controlled access gates).	Terrorism	CC, GF	Medium / 9	Medium
Goal 8 – Enhance Cyber Security	Objective 8.1 - Implement Property Protection Projects to Enhance Cyber Security	Project 8.1.1 - Conduct vulnerability assessment of critical cyber infrastructure.	Cyber Security	CC, GF	High / 10	High
		Project 8.1.2 - Conduct external security audit of fire walls on networks.	Cyber Security	CC, GF	High / 10	High
		Project 8.1.3 - Expand access to controls that check computers to enhance security.	Cyber Security	CC, GF	High / 10	High
	Objective 8.2 - Implement Public Education and Awareness Projects to Enhance Cyber Security	Project 8.2.1 - Require training for employees and local organizations on cyber security.	Cyber Security	CC, GF	High / 10	High

Table 5.5-2. Cascade County 2017 Mitigation Strategy

Goal	Objective	Project	Hazard	Jurisdiction	Benefit-Cost Ranking/Score	County Priority
Goal 8 – Enhance Cyber Security	Objective 8.3 - Support Mapping/Analysis/Planning Projects to Enhance Cyber Security	Project 8.3.1 – Perform cyber mapping for planning and vulnerability mitigation.	Cyber Security	CC, GF	Medium / 9	High
Goal 9 – Reduce Impacts from All Hazards	Objective 9.1 - Implement Prevention Projects to Reduce Impacts from All Hazards	Project 9.1.1 - Provide NOAA weather radios to all schools and critical facilities.	All Hazards	CC, GF, B, C, N	Medium / 8	High
		Project 9.2.1 - Update list of emergency shelter locations in each community.	All Hazards	CC, GF, B, C, N	High / 10	Medium
		Project 9.2.2 - Obtain generators for emergency shelters.	All Hazards	CC, GF, B, C, N	Medium / 9	Low
		Project 9.2.3 - Continue to aggressively address rural locations within the county so people's residences can be found for rescue purposes.	All Hazards	CC	Medium / 8	High
		Project 9.2.4 - Identify and secure a back-up location for the dispatch center.	All Hazards	CC, GF, B, C, N	Medium / 9	High
	Objective 9.3 - Implement Public Education and Awareness Projects to Reduce Impacts from All Hazards	Project 9.3.1 - Encourage public to engage in Volunteer Organizations Active in Disaster.	All Hazards	CC, GF, B, C, N	Medium / 8	High
		Project 9.3.2 - Provide shelter-in-place training to the public	All Hazards	CC, GF, B, C, N	High / 10	High
		Project 9.3.3 - Perform public outreach/education of location of emergency shelters.	Severe Weather	CC, GF, B, C, N	Medium / 9	High
		Project 9.3.4 - Conduct public outreach campaign where special needs residents would provide information on where they live and what they need. Develop a database with this information.	Severe Weather	CC, GF, B, C, N	Medium / 7	Medium
	Notes: B = Town of Belt, C= Town of Cascade; CC = Cascade County; EMS = Emergency Medical Services; FSA = Farm Service Agency; GF = City of Great Falls; MDT = Montana Department of Transportation; MSU = Montana State University; N = Town of Neihart; NOAA = National Oceanic and Atmospheric Administration; WUI = Wildland Urban Interface					

Table 5.5-3. Cascade County 2017 Mitigation Strategy – Implementation Details

Project	Jurisdiction	Responsible Agency / Department	Progress Made	Planned Activities	Schedule	Potential Funding Source
HAZARDOUS MATERIAL INCIDENT MITIGATION PROJECTS						
Project 1.1.1 - Explore the possibility of a signed hazardous material route around Great Falls to avoid population center.	GF	County & City Planning, MDT	No progress made. Cost prohibitive.	Review recently completed long range transportation plan and determine feasibility	Mid-term	County, City, MDT
Project 1.2.1 - Ensure local emergency responders have adequate training to respond to haz-mat events consistent with local capabilities.	CC, GF, B, C, N	Emergency Managers, Fire Service Areas	GF has regional haz-mat team who trains responders.	Continue same	Ongoing	Fire Services Training School
Project 1.2.2 - Obtain regional containment equipment trailers and supplies to strategically position for response in the county.	CC, GF, B, C, N	DES, Fire Service Areas	Funding hasn't been available.	Look for funding	Mid-term	County
Project 1.2.3 - Update resource list of emergency response supplies/vendors.	CC, GF, B, C, N	Emergency Managers, Fire Service Areas	List is continually updated.	Continue same	Ongoing	County, City of GF
Project 1.3.1 - Increase public awareness of common hazardous materials either stored, used or transported through the area.	CC, GF, B, C, N	Emergency Managers, Haz/Mat Team	New project for 2017 Plan.	Use social media and PSAs to inform public.	Ongoing	County, City of GF, MDT
Project 1.3.2 - Educate teachers and school staff in schools near hazardous materials facilities and transportation routes in how to limit exposure to hazardous materials to students during an incident.	CC, GF, B, C, N	Emergency Managers, Haz/Mat Team	New project for 2017 Plan.	Provide training to public schools.	Short-term	County, City of GF
Project 1.3.3 - Evaluate opportunities to inform private property owners who live along state highways on hazardous-material traffic.	CC, GF, B, C, N	Emergency Managers, Haz/Mat Team	New project for 2017 Plan.	Use LEPC meeting to brain storm ideas and determine most effective methods.	Short-term	County, MDT
WILDFIRE MITIGATION PROJECTS						

Table 5.5-3. Cascade County 2017 Mitigation Strategy – Implementation Details

Project	Jurisdiction	Responsible Agency / Department	Progress Made	Planned Activities	Schedule	Potential Funding Source
Project 2.1.1 - Continue grants programs for landowners to create defensible space.	CC	DES, Fire Service Areas, Rural Fire Council	A lot done in Monarch/Neihart area.	Fire Depts. administering program.	Ongoing	FEMA, DNRC, USFS, BLM, County
Project 2.2.1 - Continue education programs to raise consciousness of landowners on wildfire.	CC, GF, B, C, N	Fire Service Areas, FireSafe Montana	Done in conjunction with landowner defensible space projects. Personal visits by fire dept. to residences.	Continue same.	Ongoing	County, USFS, BLM
Project 2.3.1 - Recruit and train volunteer firefighters.	CC, GF, B, C, N	Rural Fire Council, Fire Service Areas	Training ongoing. Commercials on TV, articles in news media on volunteering.	Continue same.	Ongoing	FEMA, County, DNRC
Project 2.3.2 - Obtain more 4-WD tenders.	CC	Rural Fire Council, Fire Service Areas	New tenders in Sand Coulee, Simms, and Monarch.	Neihart looking for new tender. Consider GSA surplus property.	Ongoing	GSA, FEMA, DNRC
Project 2.3.3 - Install culverts on initial attack roads in Dearborn area.	CC	Rural Fire Council, County Commissioners, Public Works, Private Landowners, Fire Service Areas	No progress to report.	Work with private landowners to identify locations. Obtain funding. Implement project.	Ongoing	FEMA, County, USFS, BLM, DNRC
Project 2.3.4 - Improve training and qualifications of personnel to more effectively interface with incoming Incident Management Teams deployed in the county.	CC, GF, B, C, N	DNRC, USFS, FEMA, Emergency Management, Rural Fire Council	Fire Depts. receive IC training as needed	Ongoing as more IC training obtained	Mid-term	FEMA, DNRC, County
Project 2.3.5 - Increase availability of water resources for wildland firefighting by strategic placement of water tanks and ponds.	CC, GF, B, C, N	Rural Fire Council, DNRC	No progress to report	Consider locations for dry hydrant. Acquire water rights. Install.	Long-term	County, FEMA, DNRC
Project 2.3.6 - Create a database of water sources for firefighting and make database available to rural fire districts.	CC, B, C, N	County & City of Great Falls GIS	Being worked on continually. Gore Hill has completed list.	Continue same.	Ongoing	County, City of Great Falls
Project 2.3.7 - Perform fuel treatments along evacuation routes.	CC	DES, Fire Service Areas, County Fire Council	Most needed in Dearborn area but no progress to report because access is private.	Provide outreach to landowners and develop project.	Ongoing	FEMA, DNRC, USFS, BLM, County

Table 5.5-3. Cascade County 2017 Mitigation Strategy – Implementation Details

Project	Jurisdiction	Responsible Agency / Department	Progress Made	Planned Activities	Schedule	Potential Funding Source
Project 2.4.1 - Study creation of fire breaks in appropriate locations in Conservation Reserve Program lands and areas of future development.	CC	DES, Fire Service Areas, Farm Service Agency	No progress to report.	Work with Farm Service Agency and program participants to plan project.	Mid-term	County, Farm Service Agency
Project 2.4.2 - Conduct WUI mapping to support new Community Wildfire Protection Plan.	CC, GF, B, C, N	Rural Fire Council	New project for 2017 Plan.	Establish WUI parameters. Coordinate mapping with fire departments.	Short-term	County, grant
Project 2.4.3 - Update Community Wildfire Protection Plan.	CC, GF, B, C, N	Rural Fire Council	New project for 2017 Plan.	Secure funding and hire contractor once WUI mapping is complete.	Mid-term	County, grant
Project 2.4.4 - Complete a study of impact fees for rural residents to fund more reliable water supplies and fire safety.	CC	County Planning	HOAs usually deal with this. Fire Dept. do inspections on request. No progress to report.	Meet with commissioners, research approach, design possible scenarios, public meetings with residents	Short-term	County
SEVERE WEATHER & DROUGHT MITIGATION PROJECTS						
Project 3.1.1 - Install windows with shatterproof glass at new schools and critical facilities and upgrade windows at existing facilities during regular maintenance.	CC, GF, B, C, N	DES, School Districts	Two new schools and several addition being built to include window upgrades.	Continue same.	Long-term	FEMA, County, Schools
Project 3.2.1 - Promote the National Weather Service's Severe Weather Awareness program.	CC, GF, B, C, N	NWS, Emergency Managers	Presentations made to LEPC. NWS pushes out to info to public.	DES to push out info on NWS program via social media.	Ongoing	NWS, County
Project 3.2.2 - Promote National Weather Service's severe weather spotter training program.	CC, GF, B, C, N	NWS, DES	Spotter training offered annually.	Continue same.	Ongoing	NWS
Project 3.2.3 - Support drought programs implemented through the Conservation District, FSA, and MSU extension.	CC, GF, B, C, N	Emergency Managers, Conservation District	New Project for 2017 Plan.	Push info out to the public using social media.	Ongoing	County
Project 3.2.4 - Implement projects from Conservation District's drought planning process.	CC, GF, B, C, N	Conservation District	New Project for 2017 Plan.	Determine projects. Apply for funding. Implement.	Long-term	Grants

Table 5.5-3. Cascade County 2017 Mitigation Strategy – Implementation Details

Project	Jurisdiction	Responsible Agency / Department	Progress Made	Planned Activities	Schedule	Potential Funding Source
Project 3.3.1 - Encourage utility companies to bury power lines where interruption of service is frequent.	CC, GF, B, C, N	Emergency Managers, Public Works, Utility Companies	City subdivision regulations now require power to be underground.	Continue conversations with NorthWestern Energy.	Long-term	County, Utility Companies
COMMUNICABLE DISEASE MITIGATION PROJECTS						
Project 4.1.1 - Support Public Health Department's public education programs on communicable disease.	CC, GF, B, C, N	City-County Health Dept.	New Project for 2017 Plan.	Part of Public Health Depts. mission.	Ongoing	City-County Resources
Project 4.1.2 - Promote immunizations and disseminate information.	CC, GF, B, C, N	City-County Health Dept.	New Project for 2017 Plan.	Part of Public Health Depts. mission.	Ongoing	City-County Resources
Project 4.1.3 - Promote active surveillance between Public Health and healthcare providers.	CC, GF, B, C, N	City-County Health Dept.	New Project for 2017 Plan.	Part of Public Health Depts. mission.	Ongoing	City-County Resources
TRANSPORTATION ACCIDENT MITIGATION PROJECTS						
Project 5.1.1 - Continue exercises to prepare for mass casualty incidents.	CC, GF, B, C, N	Emergency Managers, Law Enforcement. Local healthcare providers	County-City continues to be well trained.	Continue same.	Ongoing	County, City, MHP
Project 5.1.2 - Recruit and train EMS volunteers to staff Quick Response Units.	CC, GF, B, C, N	DES	Ongoing recruiting and training program offered.	Continue same.	Ongoing	County
Project 5.2.1 - Work with railroad to reconstruct Belt underpass to create a wider and straighter alignment.	B	DES, City of Belt	Commissioners and Town Council have discussed strategy to get this done. Worked with Sweetgrass Development for funding.	Continue same.	Long-term	Railroads
Project 5.2.2 - Encourage railroads to enhance safety at crossings.	CC, GF, B, C	Public Works	GPS'd locations of rail crossings, painted crossing gates.	Continue same.	Long-term	Railroads
Project 5.3.1 - Support MDT's Transportation Safety Program.	CC, GF, B, C, N	County Planning	City-County supports program by pushing safety info out to public.	Continue same using social media.	Ongoing	County, MDT

Table 5.5-3. Cascade County 2017 Mitigation Strategy – Implementation Details

Project	Jurisdiction	Responsible Agency / Department	Progress Made	Planned Activities	Schedule	Potential Funding Source
FLOODING AND DAM FAILURE MITIGATION PROJECTS						
Project 6.1.1 - Re-certify the West Great Falls and Vaughn levees.	CC, GF	Levee districts	Levee districts continue O&M to maintain certification.	Districts will continue levee O&M	Short-term	Levee districts, Property stakeholders
Project 6.2.1 - Educate homeowners on the advantages of purchasing flood insurance through the National Flood Insurance Program.	CC, GF, B, C, N	County & City Floodplain Administrators and Planning Offices	Brochures available at Planning Dept. offices.	Continue same. Push out info via social media.	Ongoing	County & City of GF
Project 6.2.2 - Work towards achieving a lower rating through the National Flood Insurance Program Community Rating System.	CC, GF, B, C, N	City & County Floodplain Administrators and Planning Offices	Ongoing. County had five year review in 2016. GF going thru review now. Trying to get to 7. New CRS manual due out.	Create public participation board that meets twice per year.	Ongoing	County, City of GF, and Towns
Project 6.2.3 - Participate in the National Weather Service's Flood Awareness program.	CC, GF, B, C, N	Emergency Managers	Info pushed out to public during spring.	Continue same using social media.	Ongoing	County, City of GF, NWS
Project 6.2.4 - Provide awareness training to repetitive loss property owners (and others) on mitigation programs to relocate, elevate, and floodproof structures in the floodplain.	CC, GF, B, C, N	Floodplain Administrators	Info on city & county websites. Public come to Planning Office to discuss.	Continue same.	Ongoing	DNRC, FEMA
Project 6.2.5 - Conduct public outreach / education with residents living in inundation areas.	CC, GF, C	DES, Planning	County pushes info out to public.	Create public participation board that meets twice per year. Use social media to push out info.	Ongoing	County, City of GF
Project 6.3.1 - Obtain river gauges for 6th Street SW bridge in Great Falls, in the town of Sun River, and elsewhere as needed.	CC, GF	DES, Levee District, USGS, DNRC	No progress to report.	Pursue funding, acquire and install equipment.	Mid-term	USGS, DNRC, City of Great Falls, Cascade County
Project 6.3.2 - As needed, remove woody vegetation from the edge of the county's levee and dikes.	CC, GF, B	Levee Districts, City of Belt	W GF levee district spent \$55K to remove debris over 3 seasons.	Continue same.	Ongoing	FEMA, City of Belt, Levee Districts, Cascade County

Table 5.5-3. Cascade County 2017 Mitigation Strategy – Implementation Details

Project	Jurisdiction	Responsible Agency / Department	Progress Made	Planned Activities	Schedule	Potential Funding Source
Project 6.3.3 - Remove debris from floodways.	CC, GF, B, C, N	Levee Districts, City of Belt, Public Works, MDT, Conservation District	Ongoing by Conservation District	Continue same.	Ongoing	FEMA, County, City of Belt, MDT
Project 6.3.4 - Install and maintain security fencing and signage on levees and dikes in the county.	CC, GF, B	Levee Districts, City of Belt, Private Owners	W GF levee district has replaced aging fencing and look for areas to enhance fencing.	Continue same.	Ongoing	FEMA, Levee Districts, Private Owners
Project 6.3.5 - Consider forming a flood control district in Belt to address concerns with the dike.	B	City of Belt	No progress to report.	Hold public meeting to start process. Request input from FEMA.	Mid-term	City of Belt
Project 6.4.1 - Reduce flooding in the Gibson Flats area by installing drainage ditches in the vicinity of Gerber Road.	CC	County Public Works	City has constructed upstream detention and bypass channel	Implement additional improvements.	Long-term	FEMA, County
Project 6.4.2 - Resize culverts in various locations throughout the county.	CC, GF, B, C, N	County and City of GF Public Works Departments	Culverts installed on Briggs Rd., Collins Rd (2), Fields Rd., Gerber Rd. (2), Gibson Flats	Continue same.	Mid-term	FEMA, County
Project 6.4.3 - Identify locations in Neihart where culverts are needed.	N	Town of Neihart	Town working with EPA on five locations where culverts needed.	Implement project using federal funding.	Ongoing	EPA
Project 6.4.4 - Redesign the storm drain system in Belt.	B	City of Belt	Installed automatic emergency dialer on lift station to warn if storm water is backing up.	Apply for grant. Hire engineer. Implement project.	Long-term	CDBG, City of Belt
Project 6.4.5 - Construct a dike on the west side of the town of Sun River	CC	Cascade County	No progress to report.	Look for project funding.	Long-term	FEMA, County
Project 6.4.6 - Protect riverside berms along the Sun River to prevent erosion.	CC	West Great Falls Flood Control & Drainage District	New project for 2017 Plan.	Hire engineer to develop report with cost estimates. Explore funding sources.	Mid-term	WGFFCDD, County
Project 6.4.7 - Evaluate the outlets on West Great Falls levee for improvements in stormwater drainage	GF	West Great Falls Flood Control & Drainage District	New project for 2017 Plan.	Hire engineer to develop report with cost estimates. Explore funding sources.	Mid-term	WGFFCDD, City of GF

Table 5.5-3. Cascade County 2017 Mitigation Strategy – Implementation Details

Project	Jurisdiction	Responsible Agency / Department	Progress Made	Planned Activities	Schedule	Potential Funding Source
Project 6.4.8 - Update the storm water system in the Town of Cascade	C	Cascade Public Works	New project for 2017 Plan.	Apply for grant. Hire engineer. Implement project.	Long-term	CDBG
TERRORISM MITIGATION PROJECTS						
Project 7.1.1 - Conduct comprehensive vulnerability assessment that provides priorities.	CC, GF	GF Police, Cascade County Sheriff's Office	New project for 2017 Plan.	Determine whether can be done in-house. Implement assessment. Present results to commissioners.	Short-term	County & City Resources
Project 7.1.2 - Prioritize active shooter/armed intruder response training for employees of critical facilities.	CC, GF	GF Police, Cascade County Sheriff's Office	New project for 2017 Plan. 2/24/17 – GF Civic Center is conducting active shooter response training exercise	After project 7.1.1 is complete, move forward with training project	Ongoing	County & City Resources
Project 7.2.1 - Consider installing video surveillance or alarms in critical facilities, especially in unattended locations (i.e. water towers/communication sites/power or water substations).	CC, GF	GF Police, Cascade County Sheriff's Office	New project for 2017 Plan.	After project 7.1.1 is complete, move forward with surveillance project	Mid-term	County & City Resources
Project 7.2.2 - Consider physical hardening of critical facilities (i.e. anti-vehicle barricades / interior barricades for locking doors [door kicks, door stops] / perimeter fencing / controlled access gates).	CC, GF	GF Police, Cascade County Sheriff's Office	New project for 2017 Plan.	After project 7.1.1 is complete, move forward with hardening project. Design and implement anti-terrorism infrastructure into new schools funded by 2017 mil levee.	Long-term	County & City Resources
CYBER SECURITY MITIGATION PROJECTS						
Project 8.1.1 - Conduct vulnerability assessment of critical cyber infrastructure.	CC, GF	City & County IT	New project for 2017 Plan.	Discuss with IT depts. and determine whether outside contractor is needed. Conduct assessment and implement recommendations.	Short-term	County & City Resources
Project 8.1.2 - Conduct external security audit of fire walls on networks.	CC, GF	City & County IT	New project for 2017 Plan.	Secure funding, develop SOW, hire contractor, implement recommendations	Short-term	County & City Resources, Grants
Project 8.1.3 - Expand access to controls that check computers to enhance security.	CC, GF	City & County IT	New project for 2017 Plan.	Determine hardware needs, secure funding, purchase and train, roll out to systems	Short-term	County & City Resources, Grants

Table 5.5-3. Cascade County 2017 Mitigation Strategy – Implementation Details

Project	Jurisdiction	Responsible Agency / Department	Progress Made	Planned Activities	Schedule	Potential Funding Source
Project 8.2.1 - Require training for employees and local organizations on cyber security.	CC, GF	City & County IT	New project for 2017 Plan.	Expand programs currently in place, conduct annual refresher course, offer program to local organizations.	Ongoing	County & City Resources
Project 8.3.1 – Perform cyber mapping for planning and vulnerability mitigation.	CC, GF	City & County IT	New project for 2017 Plan.	Hire contractor to perform cyber mapping. Review results and analyze for vulnerabilities. Develop plan to mitigate.	Short-term	County & City Resources
ALL-HAZARD MITIGATION PROJECTS						
Project 9.1.1 - Provide NOAA weather radios to all schools and critical facilities.	CC, GF, B, C, N	Emergency Managers, National Weather Service	Some progress made.	Continue to distribute as funding allows.	Ongoing	County, NWS, FEMA
Project 9.2.1 - Update list of emergency shelter locations in each community.	CC, GF, B, C, N	Emergency Managers, ARC, VOAD, City & County GIS	Complete for City. Working on it for County.	When all shelters identified push out map and info to public.	Ongoing	County, City of GF
Project 9.2.2 - Obtain generators for emergency shelters.	CC, GF, B, C, N	Emergency Managers	No progress to report.	Look for mobile generators instead of stationary. Develop generator ready connections.	Long-term	GSA, Facility Owner
Project 9.2.3 - Continue to aggressively address rural locations within the county so people's residences can be found for rescue purposes.	CC	DES, GIS	Protocol in addressing manual on where to post numbers has been established. Emergency responders identify residences without numbers and GIS/Public Works assigns numbers.	As new residences built, rural addressing continues.	Ongoing	County
Project 9.2.4 - Identify and secure a back-up location for the dispatch center.	CC, GF, B, C, N	Emergency Managers	Identified and evaluated locations.	Meet to discuss. Make decisions and implement.	Mid-term	County, City of GF
Project 9.3.1 - Encourage public to engage in Volunteer Organizations Active in Disaster.	CC, GF, B, C, N	Emergency Managers	No progress to report.	Work on this through LEPC. Push out info to public via social media.	Ongoing	County, City of GF
Project 9.3.2 - Provide shelter-in-place training to the public	CC, GF, B, C, N	Emergency Managers	New project for 2017 Plan	Obtain materials. Push out via social media to public.	Ongoing	County, City of GF

Table 5.5-3. Cascade County 2017 Mitigation Strategy – Implementation Details

Project	Jurisdiction	Responsible Agency / Department	Progress Made	Planned Activities	Schedule	Potential Funding Source
Project 9.3.3 - Perform public outreach/education of location of emergency shelters.	CC, GF, B, C, N	Emergency Managers	City shelters identified. County still working on.	Finish identification in county. Push out info and map to public	Mid-term	County, City of GF
Project 9.3.4 - Conduct public outreach campaign where special needs residents would provide information on where they live and what they need. Develop a database with this information.	CC, GF, B, C, N	Emergency Managers, LEPC Subcommittees	Some progress. Have had meetings North Central Montana Independent Living Project. Written into Health Dept. Plan.	Tied with ARC shelter mandate.	Ongoing	County, City of GF
Notes: ARC = American Red Cross; B = Town of Belt, BLM = U.S. Bureau of Land Management; C = Town of Cascade; CC = Cascade County; CDBG = Community Development Block Grant; CRS = Community Rating System; DES = Disaster and Emergency Services; DNRC = Montana Department of Natural Resources and Conservation; EMS = Emergency Medical Services; EPA = U.S. Environmental Protection Agency; FEMA = Federal Emergency Management Agency; FSA = Farm Service Administration; GF = City of Great Falls; GIS = Geographic Information Systems; GPS = Global Positioning System; GSA = Government Surplus Agency; HOA = Home Owners Association; IC = Incident Command; IT = Information Technologies; LEPC = Local Emergency Planning Committee; MDT = Montana Dept. of Transportation; MHP = Montana Highway Patrol; MSU = Montana State University; N = Town of Neihart; NOAA = National Oceanic and Atmospheric Administration; NWS = National Weather Service; O&M = Operations and Maintenance; USFS = U.S. Forest Service; USGS = U.S. Geological Survey; VOAD = Volunteer Organization Active in Disasters; WGFCDD = West Great Falls Flood Control and Drainage District; WUI = Wildland Urban Interface						

SECTION 6. PLAN MAINTENANCE PROCEDURES

The plan maintenance section details the formal process that will ensure that the Cascade County MHMP remains an active and relevant document. The maintenance process includes a schedule for monitoring and evaluating the plan and producing a plan revision every five years. The plan can be revised more frequently than five years if the conditions under which it was developed change significantly (e.g. a major disaster occurs and projects are accomplished and/or new projects need to be identified, or funding availability changes). This section also describes how Cascade County will monitor the progress of mitigation activities and be incorporated into existing planning mechanisms. The final section describes how the Cascade County will integrate public participation throughout the plan maintenance process.

6.1 Monitoring, Evaluating and Updating the Plan

Evaluation of the mitigation plan consists of an assessment of whether the planning process and actions have been effective and whether changes are needed. The review should determine whether the hazards profiled remain relevant and what new or emerging hazards may affect the area, whether capabilities have changed to support mitigation, and whether the Plan goals are being reached. Plan updates typically occur every five years but can take place more frequently, if needed.

6.1.1 2011 PDM Plan

The 2011 PDM Plan was monitored and evaluated a number of times since it was updated in 2011. The entire Plan was reviewed biannually and hazard priorities and mitigation projects were discussed, as needed.

6.1.2 2017 MHMP

The updated MHMP should be reviewed at meetings of the LEPC. A different hazard profile should be reviewed quarterly by the LEPC. The plan review should consider any new hazards and vulnerabilities as well as document completed mitigation projects, identify new mitigation projects and evaluate mitigation priorities. The review should determine whether a plan update is needed prior to the required five-year update.

The Cascade County DES Coordinator will be responsible for ensuring the MHMP review is on the agenda at the LEPC meetings so that applicability of the plan can be evaluated. The DES Coordinator should prepare a status report summarizing the outcome of the plan review and the minutes should be made available to interested stakeholders and kept in a permanent file designated for the next (2022) MHMP update.

The MHMP will also be evaluated and revised following any major disasters, to determine if the recommended actions remain relevant and appropriate. The risk assessment will also be revisited to see if any changes are necessary based on the pattern of disaster damages. This is an opportunity to increase the community's disaster resistance and build a better and stronger community.

Three years after adoption of the MHMP, the Cascade County DES Coordinator may decide to apply for a planning grant through FEMA to start the 2022 MHMP update. Upon receipt of funding, the County will solicit bids in accordance with applicable contracting procedures and hire a contractor to assist with the project. The proposed schedule for completion of the plan update is one year from award of a contract, to coincide with the five-year adoption date of the 2017 MHMP Update.

The Cascade County DES Coordinator will be responsible for the plan update. Before the end of the five-year period, the updated plan will be submitted to FEMA for approval. When concurrence is received that the updated plan complies with FEMA requirements, it will be submitted to the Cascade County Board of Commissioners, Great Falls City County and Town Councils in Belt, Cascade, and Neihart for adoption. The DES Coordinator will send an e-mail to individuals and organizations on the stakeholder list to inform them that the updated plan is available on the County website.

6.2 Monitoring Progress of Mitigation Activities

The process for monitoring and evaluating mitigation projects is the responsibility of the LEPC, an organization comprised of local officials from Cascade County, the City of Great Falls and Towns of Belt, Cascade, and Neihart, emergency response entities, local businesses, and non-profit organizations who meet on a regular basis.

6.2.1 2011 PDM Plan

Since development of the 2011 PDM Plan, several mitigation projects were completed in Cascade County while a number of other projects are on-going and will continue through the next planning period. The LEPC discusses hazard mitigation on a quarterly basis and prioritizes projects based on the severity of hazard events that have occurred in the county and funding that is available for identified projects. Completed projects are identified in *Section 5.1*.

The Cascade County DES Coordinator has monitored completion of most mitigation projects; however, the 2011 PDM Plan did not outline a specific process to track the initiation, status, and completion of mitigation activities. Each department monitors completion of mitigation projects under their purview: i.e., the Cascade County Rural Fire Council monitors wildfire projects; the County and City/Town Public Works department's monitor culvert and drainage projects within their jurisdiction; the DES Coordinator monitors severe weather projects; and, the levee districts monitor projects associated with levee operations and maintenance.

6.2.2 2017 MHMP

The LEPC will review the mitigation goals, objectives, and activities to ensure progress is being made. They will evaluate the feasibility of the mitigation projects, monitor resources, budgets, and schedules, and document project completion. This group will provide a venue for reporting and accountability.

Minutes should be prepared from these meetings and should be distributed to interested stakeholders as well as kept in a permanent file for the next MHMP update (2022). Agencies and organizations "assigned" responsibility for various aspects of the mitigation strategy will have the opportunity to coordinate with the LEPC on challenges, success and opportunities.

The information that the LEPC shall be expected to document, as needed and appropriate, include:

- Any grant applications filed on behalf of any of the participating jurisdictions;
- Hazard events and losses occurring in their jurisdiction;
- Progress on the implementation of mitigation actions, including efforts to obtain outside funding;
- Obstacles or impediments to implementation of actions;
- Additional mitigation actions believed to be appropriate and feasible; and
- Public and stakeholder input.

Mitigation project evaluations will assess whether:

- Goals and objectives address current and expected conditions.
- The nature or magnitude of the risks has changed.
- Current resources are appropriate for implementing the MHMP and if different or additional resources are now available.
- Actions were cost effective.
- Schedules and budgets are feasible.
- Implementation problems, such as technical, political, legal or coordination issues with other agencies are presents.
- Outcomes have occurred as expected.
- New agencies/departments/staff should be included.

Individual projects will be monitored by the department implementing the project or the grant. Generally, HMGP and PDMC projects will be monitored by the DES Coordinator and any National Fire Plan projects or Community Assessment Agreements will be monitored by the Cascade County Fire Department, U.S. Forest Service, BLM and/or DNRC. Each organization will track projects through a central database and issue quarterly reports to federal agencies.

The MHMP Planning Team will continually observe the processes for implementation of the mitigation projects. By monitoring project implementation, the Planning Team will then be able to evaluate them at the time of the plan update and determine if any changes are needed.

Cascade County may want to consider measuring their mitigation success by participating in the STAR Community Rating System. Local leaders can use the STAR Community System to assess how sustainable they are, set goals for moving ahead and measure progress along the way. To get started, go to <http://starcommunities.org/get-started>.

6.3 Implementation through Existing Programs

Cascade County will have the opportunity to implement hazard mitigation projects through existing programs and procedures through plan revisions or amendments. The MHMP will be incorporated into the plans, regulations and ordinances as they are updated in the future or when new plans are developed. **Table 6.3-1** presents a summary of existing plans and ordinances and how integration of mitigation projects will occur.

A summary of how the MHMP can be integrated into the legal framework is presented below:

- Partner with other organizations and agencies with similar goals to promote building codes that are more disaster resistant on the State level.

- Develop incentives for local governments, citizens, and businesses to pursue hazard mitigation projects.
- Allocate County resources and assistance for mitigation projects.
- Partner with other organizations and agencies in northwestern Montana to support hazard mitigation activities.

Table 6.3-1. Implementation of Mitigation into Existing Plans and Codes

Type	Name	Integration Technique
Plans		
Emergency Operations	Cascade County Emergency Operations Plan, 2011	Integrated by reference in MHMP.
	Emergency Action Plan, Black Eagle Dam	Dam failure mitigation projects should be integrated in EAPs when these documents are revised.
	Emergency Action Plan, Cochrane Dam	
	Emergency Action Plan, Morony Dam	
	Emergency Action Plan, Rainbow Dam	
	Emergency Action Plan, Ryan Dam	
Growth Policies	Cascade County Growth Policy, 2013	Integration of mitigation strategies will occur when growth policies are revised.
	City of Great Falls Growth Policy, 2014	
	Town of Cascade Growth Policy, 2011	
	Town of Neihart Growth Policy, 2016	
	Malmstrom AFB Joint Land Use Study, 2012	
Wildfire Mitigation	Community Wildfire Protection Plan, 2008	Wildfire mitigation projects will be incorporated when plan is revised.
Flooding	Cascade County Flood Insurance Study, 2013	Integration of mitigation strategies will occur, as appropriate, when plan is revised.
Transportation	Long Range Transportation Plan, 2014	Mitigation projects to be integrated during plan revisions.
	Missouri River Urban Corridor Plan	
Winter Weather	City of Great Falls Snow and Ice Control Plan, 2007	Mitigation projects to be integrated during plan revision.
Codes, Regulations & Ordinances		
Zoning	Cascade County Zoning Regulations, 2016	Mitigation projects will be incorporated into revisions of zoning ordinances.
	City of Great Falls Zoning Regulations, 2017	
Subdivisions	Cascade County Subdivision Regulations, 2013	Mitigation projects will be incorporated into revisions of subdivision regulations.
	City of Great Falls Subdivision Regulations	
Floodplain	Cascade County Floodplain Regulations, 2013	Flood mitigation projects will be incorporated into revisions of floodplain regulations.
	City of Great Falls Amendment to Floodplain Regulations, 2016	

Cascade County, the City of Great Falls, and Towns of Cascade and Neihart use a Growth Policy to guide development. The Town of Belt is in the process of adopting a growth policy. Typically, a Growth Policy will address hazards; specifically, that life and property be protected from natural disasters and man-caused hazards. Mitigation goals in the MHMP will be recommended for incorporation into future revisions of these growth policies to ensure that high-hazard areas are being considered for low risk uses.

To ensure that the requirements of the MHMP are incorporated into other planning mechanisms and remain an on-going concern in Cascade County, job descriptions of various staff will be enhanced to include a mitigation component. The job descriptions of Cascade County Planning Director will be augmented to include involvement in the LEPC. Participation in this group will provide an awareness of new and on-going mitigation initiatives for the purpose that they be integrated into plans, codes

and regulations during revision. The job description of the GIS Manager, will include responsibilities for management and update of the spatial data compiled for the hazard analysis including coordinates of critical facilities and digital floodplain, inundation, and wildfire layers so this data can be integrated into other planning efforts. The job description of the DES Coordinator will include responsibilities for implementing outreach activities for risk reduction in the County, coordinating with the Board of County Commissioners to secure funding for mitigation projects, ensure mitigation projects are implemented, and updating the MHMP. The DES Coordinator will also be responsible for maintaining permanent master file for the MHMP planning process, which will include damage figures from hazard events, records of mitigation projects, and notes/minutes from relevant meetings.

Meetings of the Board of County Commissioners will provide an opportunity for the Cascade County DES Coordinator and City of Great Falls Emergency Manager to report back on the progress made on the integration of mitigation planning elements into County and City planning documents and procedures.

6.4 Continued Public Involvement

Cascade County is dedicated to involving the public directly in review and updates of the MHMP. The public will have many opportunities to provide feedback about the plan. Hard copies of the plan will be kept at appropriate County, City and Town offices. An electronic copy of the plan will be available on the Cascade County website. The existence and location of plan hard copies will be publicized on the Cascade County website. *Section 2.0* includes the address and the phone number of the Cascade County DES Coordinator who will be responsible for keeping track of public comments on the plan.

The public will be invited to meetings of the LEPC when the MHMP is discussed. The meetings will provide the public a forum for which they can express concerns, opinions, or ideas about the plan. The DES Coordinator will be responsible for using County resources to publicize the public meetings and maintain public involvement through the newspapers, radio and Internet.

The MHMP Planning Team will continually observe the processes for public outreach. By monitoring these activities, the Planning Team will then be able to evaluate them at the time of the plan update and determine if any changes are needed.

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